THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

VOL. VII. Nº 147—10th YEAR.] LONDON, JUNE 8, 1858. [Subscription per Ann. 15s. in Advance 18s Credit.] DOUBLE No Price 1s.

TO GAS COMPANIES.

FIRE-CLAY Retorts and Fire Goods.

The Advertiser has brought his Fire-Clay Retorts to great perfection, both as to quality and finish. Many have stood three and four years.

Every description of Fire Goods in any quantity always on hand. The Fire Clay is the very best in the North of England. Stock never less than 10,000 tons weathering.

Orders promptly executed.

Apply, G. H. RAMSAY, of Derwenthaugh Fire-Brick Works, near NEWCASTLE-ON-TYNE.

Aug. 22, 1856.

WANTED, by the London and North-WESTERN RAILWAY COMPANY, a GAS FOREMAN to take charge (under the Locomotive Superintendent) of the Manufacture and Distribution of Gas upon the Northern Division.

He must possess a general knowledge of accounts.

Salary, £150 per annum.

Application to be made by letter to C. E. STEWART, Esq., Secretary, Euston Station, LONDON.

TO IRON FOUNDERS, ENGINEERS, & OTHERS.

THE Directors of the Merthyr Tydvil GASLIGHT COMPANY are prepared to receive TENDERS for a set of Dry-lime Purifiers, Scrubber, Condensers, Hydraulic Main, and H-Pipes, with all the necessary Connexions and Valves. Also sundry other Castings.

Particulars as to size, &c., may be obtained on application to the Manager.

Sealed Tenders, addressed to the Chairman of the Directors, and endorsed "Tender for Castings," to be forwarded on or before the 16th day of June next.

The Directors do not engage to accept the lowest Tender.

By order,
JOHN LEES COCKER, Manager.

Merthyr Tydvil, Glamorganshire,
May 25, 1858.

WANTED, for a small Country Gas-Work, a WORKING SUPERINTENDENT. There is a Cottage on the Works, and Coals and Gas will be provided by the Gas Company.

Applications, stating Age and Qualifications, to be made to Mr. ALFRED PENNY, Engineer, Wenlock Iron-Works, City Road, LONDON.

COWEN'S PATENT FIRE-CLAY RETORTS.

JOS. COWEN and CO.,

BLAYDON BURN, NEAR NEWCASTLE-ON-TYNE.

Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS RETORTS and OTHER OBJECTS in FIRE CLAY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire Clay Retorts in the United Kingdom; and orders for Fire Clay Retorts of all shapes and dimensions, Fire Bricks, and every other article in Fire Clay, are promptly executed at their works as above.

COWEN'S GARESFIELD COAL AND COKE.
Coal and Coke Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

NOTICE.

THE Undersigned, having disco- vered that FIRE-BRICKS BEARING THE STAMP OF THEIR FIRM, BUT NOT MANUFACTURED BY THEM, and of a very inferior quality, are sold at the HAGUE, feel themselves bound, in defence of the well-established reputation of the goods manufactured by them, to put the public on their guard against the fraud, in order that they may not be imposed upon, and sustain loss by purchasing a spurious article.

JOSEPH COWEN & CO.,
FIRE-BRICK MANUFACTURERS,
BLAYDON BURN,
NEWCASTLE-ON-TYNE.

TO COAL MERCHANTS.

THE Directors of the Westerham Gas and COKE COMPANY (Limited) are open to receive TENDERS for 250 Tons of the best Wearmouth or Primrose Gas Coals, to be delivered, free of all charges, at the Edenbridge Station on the South-Eastern Railway, in portions of 50 tons, within Ten Months from the 1st of August next, at such times as the Manager may direct.

Tenders to be sent to the Secretary, at the Company's Office in Westerham, on or before the 28th inst.

The Directors do not bind themselves to accept the lowest or any Tender.

WILLIAM FEWELL, Secretary and Manager.

BLAYDON BURN AND LOW BENWELL FIRE-CLAY RETORT AND FIRE-BRICK WORKS, NEAR NEWCASTLE-ON-TYNE.

WILLIAM COCHRAN CARR,

begs most respectfully to thank the Metropolitan, Provincial, and Continental Gas Companies for their patronage for several years past, and to intimate that he has rebuilt and enlarged his extensive premises for the Manufacture of CLAY RETORTS; and that he is now prepared to execute the largest orders with punctuality and despatch. Orders for FIRE-CLAY RETORTS, of all shapes and sizes, FIRE-BRICKS, and all other Articles in Fire-Clay, executed on the shortest notice, and on the most reasonable terms.

London Agents:
JAMES LAWRIE & CO.,
63, OLD BROAD STREET, CITY, LONDON.

FIRST PRIZE IN THE PARIS EXHIBITION.

JOHN RUSSELL AND CO.,

THE OLD TUBE WORKS,
CHURCH HILL, WEDNESBURY,
STAFFORDSHIRE,
and 69, UPPER THAMES STREET, LONDON,

Original Manufacturers of Wrought-Iron Gas Tubes, and Holders of the present Patents; Inventors and First Makers of LAP-WELDED FLUES for Steam Boilers.

J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water, and the largest Orders may be executed in a few days.

The eminent Engineer, Mr. Perkins, confines himself altogether to the use of John Russell and Co.'s Tubes in his High-Pressure Steam Patents.

Gun Metal, and all other kinds of Cocks, Stocks, Dies, and Taps, Galvanised Tubes, &c.

N.B. All Goods thoroughly Tested before sent out, and Warranted.

TO GAS COMPANIES AND OTHERS.

WANTED, by a thoroughly practical man, 29 years of age, who is a good accountant, a permanent situation as Manager, Foreman, Gas-fitter, Main and Service Layer, &c., or in any similar capacity.

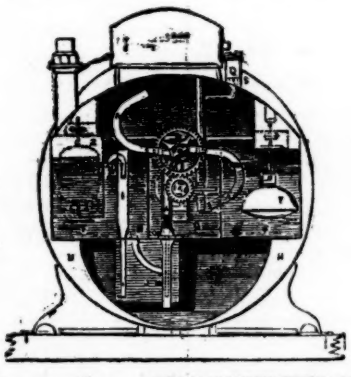
Testimonials, with references as to character and capability, can be produced.

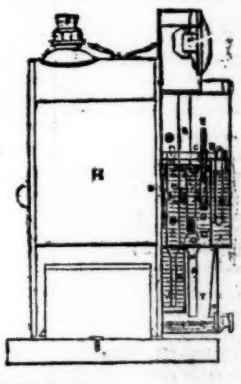
Address, X. Y. Z., Post-office, MAIDSTONE.

CROSLEY & CO.,

GAS-METER MANUFACTURERS,

103, SOUTHWARK BRIDGE ROAD, LONDON.





SOLE LICENCEES AND MANUFACTURERS OF

W. CROSLEY'S AND CROSLEY AND GOLDSMITH'S

PATENT STANDARD SELF-ADJUSTING AND COMPENSATING GAS-METERS,

By which the True Water-Line is constantly maintained, and accuracy of measurement at all times secured. SEVERAL THOUSANDS OF THEM HAVE BEEN FIXED, AND ARE NOW AT WORK, and numerous Testimonials from eminent Gas Engineers, expressive of their approbation of them, may be seen at the Manufacturers'.

Manufacturers of LOWE'S PATENT MOTIVE-POWER METER, for situations where there is an inadequacy of pressure to supply the special requirements of certain consumers in low grounds during the day or night.

Also, Manufacturers of EXPERIMENTAL METERS, GASHOLDERS, GOVERNORS, MINUTE-CLOCKS, PHOTOMETERS, &c. &c., similar to those used by Mr. King, of Liverpool.

C. and Co. continue to manufacture ordinary WET METERS of the very best description, Mr. W. Crosley having been for many years the principal and confidential assistant of his relative, the late Mr. Samuel Crosley, of Cottage Lane, City Road, up to the time of his decease, in which capacity he communicated to W. C. the secret of the mixture of the metals which has rendered the Crosley Meter so durable and superior to all others, as is evidenced by a large number of them being still at work after having stood the test of nearly a quarter of a century's use.

JOURNAL OF GAS LIGHTING PENNY

By Her Majesty's Royal Letters Patent.

JAMES MEACOCK,

PATENT DRY and IMPROVED WET GAS-METER WORKS,

7, SNOW HILL, AND 16, WEST STREET, LONDON.

ESTABLISHED 1836.

J. MEACOCK begs to call attention to his patent method of securing the Leather diaphragm of his Dry Meter. Instead of using the soldering iron for this purpose, it is held between two flat Metal Rings, and screwed up sound to a metal frame, as shown in the drawing.

By this improvement the perishing effect of hot tools to leather being avoided, its durability must be longer; also, its repair when needful is most simple, as a new leather diaphragm can be applied by merely unscrewing the old one from the rim or frame to which it had been screwed up.

Meters of Gas Companies being subject to so much wear and tear, J. M. begs leave to assure those who may honour him with their commands, that nothing but the stoutest materials for cases, the hardest gas-resisting metals, and best foreign leather for the interiors, will be used, and none but first-class workmen employed in their construction.

Wet Gas-Meters Repaired and Reconstructed with J. Meacock's Modern Improvements.

METERS SENT ON APPROVAL.

In consequence of the great demand for the above Meters, J. Meacock has found it necessary to remove his Manufactory to more extensive Premises, 16, West Street, Smithfield, where Orders will be executed on the shortest notice.

PATENT FLEXIBLE GAS TUBING, VULCANIZED INDIARUBBER HOSE-PIPES, WASHERS, PACKING, &c.

JAMES LYNE HANCOCK begs to announce a considerable REDUCTION in PRICE of his PATENT VULCANIZED INDIARUBBER TUBING.

VULCANIZED INDIARUBBER AIR-TIGHT BAGS, any size, for Gas Mains, with flexible tubes attached, and fitted with stop-cocks complete.

Manufactory and Warehouse, No. 6, Goswell Road, LONDON (E.C.).

NOTICE.—Mr. N. DEFRIES, Consulting GAS ENGINEER, begs to inform gas companies and the public, that he is desirous of meeting any gentlemen at his WORKS, NEW ROAD, ST. PANCRAS, where, under his own superintendence of the manufacturing department, they will have the fullest opportunity of investigating the many improvements he has recently effected in his ROTARY-VALVE DRY GAS-METER, by which full security will be afforded against leakage and non-registration, even against the searching effects of Cannel Coal Gas. The Rotary-Valve Meter is warranted to register inflexibly correct at a working pressure of half a tenth, and less than a quarter of a foot per hour upon a blue light; and a guarantee will be given to all gas companies to keep it in repair for not less than five years, free of expense. With this meter the gas-supplier may fully depend upon a fair return, and the public upon having a just measurer.

GAS BATHS, GAS COOKING and HEATING STOVES, for all classes. The British Polytechnic Gas-fire, &c. Conservatories and Buildings heated by gas, and perfect ventilation secured.

Any gentleman desirous of consulting Mr. Defries in especial cases, may meet him either at his office, 145, REGENT STREET, or at his residence, 5, FITZROY SQUARE, b giving one day's notice.

Gas-works erected for private houses, where no gas company exists.

EDWIN DIXON,
WOLVERHAMPTON PATENT WROUGHT-IRON TUBE WORKS,
Originally established in 1833,

Manufacturer of Gas and other Tubes, Fittings, and articles of every description belonging to Gas, Water, or Steam.

E. D. had the honour of receiving the

PRIZE MEDAL

warded to this Manufacture by the COUNCIL of the GREAT ENGLISH EXHIBITION of 1851; and from the latter date has supplied many towns exclusively with GALVANIZED and other Tubes for Gas and Water, under GOVERNMENT ENGINEERS.

A City, containing 150,000 inhabitants, has recently been entirely supplied with Tubes made at the above-named Works, and several others with populations nearly as great; in fact, the reputation now acquired induces this notice to the public.

Large Stocks generally on hand, averaging from one to three hundred thousand feet.

HYDRAULIC PRESS TUBES,

o resist 6000 lbs. and upwards to the square inch, exclusively manufactured.

STOCK DIES and SCREWING TACKLE,

of the best possible description.

Every Tube carefully tested with Hydraulic Pressure before leaving the Works.

CHARLES BOTTEN and SON,
ENGINEERS AND METER-MAKERS,
CRAWFORD PASSAGE, RAY STREET,
CLERKENWELL, LONDON (E. C.).

Manufacturers of Station and Patent Protector Consumers' Meters, Patent Slide-Valves, Gas-Fittings, Pipes, &c.

Also, High-pressure Cocks, Hydrants, Closets, and ch Water-Fittings.

COAL TAR.

TO be let, the whole of the Coal Tar manufactured at the works of the Sunderland Gas Company, from the 1st day of July next, for one, two, or three years, as may be agreed upon.

The Directors will receive TENDERS until eleven o'clock on Wednesday, June 30.

JOHN H. COX, Secretary.

61, Fawcett Street, Sunderland,
June 1, 1858.

TAR and GAS-WATER WANTED.—Particulars to Messrs. HILLS and Co., Warsash, SOUTHAMPTON.

IN Chancery.—In the Matter of the SOUTH ESSEX GASLIGHT and COKE COMPANY'S WINDING-UP.

NOTICE is hereby given, that the Gas-Works, Plant, &c., of this Company will be Sold by TENDER on the 1st day of July next, at the Chambers of the Vice-Chancellor Sir William Page Wood, No. 11, New Square, Lincoln's Inn.

Tenders must be sent in on or before the 29th inst., to George Broom, Esq., the Official Liquidator, 35, Coleman Street, City; and on or before the 21st inst. proposed Tenderers must forward to him their Names, Addresses, and References.

Full particulars may be obtained, and a Copy of the Contract on the proposed Sale, may be seen on application to the Official Liquidator or his Solicitor.

Dated this 5th day of June, 1858.

ROBERT PECKHAM,
4, Serjeant's Inn, Fleet Street,
Solicitor to the Official Liquidator.

WILLIAM RYDER,
GENERAL MINERAL AND METAL AGENT AND MERCHANT,
4, DEAN STREET,
NEWCASTLE-ON-TYNE,

is prepared to supply Gas and Water Companies with Apparatus and Appliances of every description, including Cast and Wrought Iron Goods, Coals, Fire-Bricks, Retorts, &c. &c.

Any communications addressed to him as above shall have prompt attention.

JAMES FEATHERSTONE,
ENGINEER,
Manufacturer of GASHOLDERS, IRON ROOFS, and every description of Gas Apparatus.
ALLIANCE IRON WORKS,
CLAYTON, near MANCHESTER.

JOHN ROGERSON and CO.,
NEWCASTLE-ON-TYNE AND MIDDLESBRO'-ON-TEES.

Wrought and Cast Iron Pipes, Cast-Iron Retorts, and all kinds of Foundry Work necessary for Gas-Works. Fire-Bricks and Clay Retorts. Gas Coals of every description. Pig, Bar, and Plate Iron.

TO THE GAS COMPANIES
OF GREAT BRITAIN AND THE CONTINENT.

CANNEL AND COAL FOR GAS PURPOSES.—Fifteen years' connexion with one of the largest Gas Concerns in England, enables us from practical experience to certify that the CANNEL and COAL we offer are those best suited for Gas purposes.

On application, we shall have much pleasure in forwarding our Tabulated Statements of Analyses, with Prices and Terms; also References as to respectability.

All Contract Orders have our careful and best attention.

EMANUEL TURNER and Co., Exporters of Cannel and Coal, 31, Castle Street, LIVERPOOL.

GAS COMPANIES

supplied with all the WORKING GAS BOOKS, GAS FORMS, &c., on the shortest notice. Also, SHARE CERTIFICATES and COMMON SEALS prepared in the best manner for all New Companies by

ALFRED DOUBBLE,
REGISTRATION AGENT,
LAW, PUBLIC COMPANIES, & MANUFACTURING STATIONER,
40 and 41, FLEET STREET, LONDON.

N.B.—List of Books, &c., sent post free on application.

M. SHEEN, Gas and Railway Lantern Maker, 90½, Holborn Hill, begs to inform Managers of Gas-Works, &c., that she continues to contract and supply Lanterns on reasonable terms, and keep them in repair by the year.

EIGHTON MOOR GAS COALS.—Parties wishing to be supplied with these first-class Gas Coals will please to apply to Mr. MATTHEW NESBIT, EIGHTON MOOR OFFICE, NEWCASTLE-UPON-TYNE. These coals are well known as among the richest in gas, and working the roundest on the River Tyne. They are extensively used by metropolitan gas works.

WILLIAM STEPHENSON & SON,
THROCKLEY,
NEWCASTLE-ON-TYNE,
MANUFACTURERS OF EVERY DESCRIPTION OF
FIRE BRICKS, CLAY RETORTS, LUMPS, TILES
&c. &c.
LONDON OFFICES:
76, KING WILLIAM STREET, CITY.

A large stock of Fire-Clay Goods always on hand in London, at the lowest wharf prices, at Messrs. CHRISTIE & Co.'s Wharf, 64, Bankside, SOUTHWARK.

GAS-WORKS ERECTED, ALTERED, VALUED, OR LEASED, BY

GEORGE WALCOTT,
GAS AND CONSULTING ENGINEER,
BEAUMARIS GAS-WORKS, ANGLESEA,

who has erected twenty Gas-Works during the last four years, all of which are giving satisfaction.

London Office, 24, Abchurch Lane, CITY.

RICHARDSON and CO.,
ENGINEERS AND IRONFOUNDERS,
TUNNEL FOUNDRY AND SPRING GARDEN IRON-WORKS,
DUDLEY, near BIRMINGHAM,

Manufacturers of Gas and Water Apparatus, Steam-Engine Boilers, Single and Double Gasholders, Tanks, Bridges, Boats, Roofs, Valves, &c.

THE PURIFYING-HOUSE SUPERSEDED.

MR. LAMING (Inventor of the Revivified Oxide of Iron Purification) has the satisfaction to announce that Gas may now be purified in a manner that combines unusual commercial advantages with all the possible requirements of the sanitary officer and the public. All that need be said to call attention to the new process is, that instead of the purifying-house, two vessels of small area, placed after the condenser, suffice; that these vessels never have the least communication with the atmosphere; and that neither lime, oxide, nor any other substance foreign to the gas itself is brought into contact with it. Gas engineers will perceive among the advantages thus offered, economy in room, labour, and materials; impossibility of nuisance; and total absence of injury to the illuminating power.

Particulars by addressing RICHARD LAMING, 118, FENCHURCH STREET.

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TO CORRESPONDENTS.

A. T.—*The 14th section of the Gas-Works Clauses Act*, 1847, *protects from distraint by a landlord the meters and fittings of gas companies, in whose special Act the General Act has been incorporated; but the protection does not extend to companies under the Joint-Stock Companies' Act or to those whose Acts were obtained previous to* 1847.

A Gas Director.—*We are unable to suggest anything for your relief. The retorts should have been properly "scurfed" before being let down.*

NOTICES.

The subscription is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders must be made payable at the Charing-Cross Money-Order Office, to William H. Bennett, No. 42, Parliament Street, Westminster.

The next number will be published on Tuesday, June 22, and the subsequent numbers on each successive alternate Tuesday.

Stamped copies, when forwarded by post, must be folded so as to expose the stamp; they are otherwise liable to the full postage charge for letters.

This Journal has been duly registered at the General Post Office for transmission abroad.

All Communications to be addressed to the Editor, No. 42, Parliament Street, Westminster; and orders for Advertisements to the Publisher, Mr. W. B. King, No. 11, Bolt Court, Fleet Street.

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 8, 1858.

NOTES UPON PASSING EVENTS.

Is it a good sign of the times that members of the House of Commons should feel themselves obliged to martyrize Newspaper Editors in order to defend their own honour; or that a contest should be waged between the leader of the House of Commons and a large portion of the Daily Press with respect to the purity or the corruption of the Fourth Estate? Unquestionably, the license of the Press ought to be curbed, especially in cases where that license affects the private character of those who gratuitously undertake the discharge of important public duties; and, as a principle, we are willing enough to admit that there is danger in allowing the motives of men entrusted with functions of a judicial character to be impugned. But the proceedings in the case of Messrs. Clive and Washington Wilks would make it seem that the public is not entitled to question the acts of its representatives, even if there should be ground for so doing; nevertheless, until Mr. E. Dennison's challenge to Mr. Clive be answered, we claim the privilege of saying nothing on the business, whilst we retain our own opinions. It is, however, a matter of very little import what may be the termination of this unworthy squabble: the really important question lately raised is, whether the leading journals of the day are, or are not, honest; and, if they be not, how can their power for evil be effectually restrained?

We ourselves believe that Mr. Disraeli was perfectly correct when he stated that the London Press was greatly under the control of the party he has nicknamed as "the Cabal;" and the very angry comments of two of the leading journals prove that the "galled jade winces." It was always a part of the system of the advocates of Government centralization to corrupt the Press; and the history of journalism, in all countries, would lead to a suspicion that there is little chance of finding anywhere a class of able, needy, and ambitious men, in possession of a great and irresponsible power, who should be endowed with sufficient strength of mind to resist the temptations to which they are likely to be exposed. The real danger of the Press in England lies precisely in this irresponsible power, for it is only by its abuses that the Fourth Estate can fall; and it is by the mystery attached to the anonymous authorship that the corruption of the leaders is sheltered. The law of the second French Republic, by which every man who inserted an article in a newspaper was obliged to sign his name to the article, was, we believe, a very wise and honest law; and most earnestly do we wish that it held in this country. No man has a right to print anything he is not prepared to sustain; the assertions of a man of honour will never lose weight by the mere fact of their appearing under his name; whilst the law we advocate would at once destroy the power of the mysterious editorial "we," which has done so much of late to falsify public opinion. The leaders of such a paper as the *Times* have a weight and influence at present greatly in excess of that which they would have, if it were known that they were written by some briefless barrister, or by some unknown student, or by some person who notoriously "simpered in gilded saloons;" and it happens also, unfortunately, that foreigners cannot, or will not, see that even the *Times* itself is only the organ of a clique, but they persist in supposing that journal to be the expression of public opinion in England. Hitherto the *Times* has been so well conducted as almost to justify the supposition; the essentially false position of the Press in our country has, however, at last told on even this marvellous journal, and it has fallen under the very thinly disguised influence of the "Cabal." This will happen again to the journal which may succeed the *Times* in its power and influence; and the only remedy we see to the evil, the only guarantee which we believe to exist for the purity and independence of the Daily Press, would lie in the destruction of its anonymous character.

It must not be supposed that in alluding to this subject we are travelling beyond the questions immediately connected with the class of interests we seek, as journalists, to represent. The recent persecution of the City Gas Company, and the attacks still more recently made upon the districting arrangements of the Metropolitan Gas Companies, may be cited as illustrations of the danger to which industrial operations are exposed from the anonymous attacks of the Press. The manifest interest of certain place-hunters to create a panic would also, if they were compelled to sign the articles they write, sufficiently explain their anxiety for the public health to destroy the effect of the horrible tales with which we have been "frightened out of our propriety;" and thus to relieve traders from the anxiety with which they now regard all sanitary legislation, and all sanitary discussions. Indeed, it is impossible to say where the power of the Press begins or ends; all are, therefore, alike interested in its being well and truly administered.

And this, be it observed, is now more important than ever; for it would be hard to discover a period in which the distinction between the legal omnipotence and the omniscience of Parliament was more painfully apparent, or when faithful guardians of the public interests were more needed. Take for instance, of the latter, one item in the Civil Service Estimates which lately passed without challenge. There figures, in this constantly-increasing portion of the national burthens, a sum of £1155 for payment of the services of Mr. Sandison, Dr. Odling, and Dr. R. D. Thompson for enforcing the Smoke Nuisance Abatement Act. Evidently, this is merely a metropolitan question; and it is unjust to throw any such portion of the metropolitan police charges on the Consolidated Fund. The amount may be small, but the principle it involves is of great moment; for it is a step towards removing the control of local affairs from the hands of local authorities, and arrays against the unlucky victim of "the Lawyer Bodkins" the whole weight, influence, and wealth of the Government. Then again, there is a sum of not less than £216,000 charged for the Poor Law Board, in addition to the enormous amount levied from ratepayers by local authorities. A sum of £17,879 is charged for the Copyhold, Enclosure, and Tithe Commission, which certainly ought to be paid for by the parties benefited; not less than £47,761 is charged for the Registrar-General's Office; whilst the hideous

"Boilers" at South Kensington, and their affiliated schools, cost the trifling sum of £43,334. It would be idle to dwell on these flagrant wastes of public money, for nobody but Mr. Williams appears to care "how the money goes;" but there was one very sensible vote arrived at with respect to the Netley Hospital, which the War Office, with its usual contempt for civil authority, has ventured (we hear) to set aside, and which we urge the Legislature to inquire into. The purport of the vote in question was to stop the progress of the Netley Hospital, because the designs for that building had been pronounced by the highest authorities to be unsuitable. Yet we learn from good authority that the works are being hurried on, without reference to the decision of the House of Commons.

As advocates for the free development of private enterprise, we most distinctly endeavour to raise a discussion as to the use of several of these costly departments of the Civil Service in any shape or form. The South Kensington Museum may be especially referred to in support of this opinion; for, in the first place, we contend that whenever the State begins to encourage art, then national taste declines; and, in the second, that the productions of the new Schools of Design have, almost without exception, been atrociously ugly. The Registrar-General's reports also have, we firmly believe, been productive of great mischief, and we therefore think that the cost of his office should be rigorously inquired into. In saying that he has done mischief, we allude to the often-repeated tale of 17 in 1000 being the normal rate of mortality, and to the ridiculous attack he was impertinent enough to make upon the officers of the Metropolitan Board of Works in his last Quarterly Return, as well as to the very unfair comparisons he attempts to draw between the waters supplied by the London Water Companies and those supplied in other towns. These statements, being often repeated in official documents, create uneasiness in the minds of parties who are not aware of the normal incapacity of Government officials; and they may lead to attacks upon well-administered public services. Besides this, if crotchety Sanitary Reformers, as they dub themselves, can dispose of the national purse to print their nonsense upon sewerage and water supply to-day, what is to prevent them from doing the same to-morrow in the case of unhealthy trades or the sale of Gas? Some time since, we pointed out the danger which existed of foreigners receiving our so-called Official publications as being worthy of credit, and we alluded especially to the improper part played by one of the principal officers of the Registrar-General's Office in sanctioning Mr. F. O. Ward's assumption of a "Representative character;" and in turning over the leaves of one of the recent numbers of the Dutch *Economist*, we found a proof of the correctness of that position. Mr. Ward is there made to figure as a member of Parliament, delegated to the Brussels *Congrès de Bienfaisance;* and though of course Englishmen laugh at the mistake, all the persons who assisted in placing Mr. Ward in the false position he assumed, are responsible for the errors they have diffused. All these questions of detail, however, turn upon the greater question of the proper sphere of Governmental Intervention in the ordinary affairs of life; and as we hold that the latter should be as little as possible, we are naturally antagonistic to all the machinery by which that interference is likely to be increased. But if, for the sake of argument, it be admitted that it is desirable to increase the power of the Central Government in this country, it must be important that its officers should be truthful and competent. The recent Governmental scientific publications have caused many able persons to question whether either of those conditions be fulfilled; and therefore it is that we hold it to be the duty of some independent members of the Legislature to inquire into the organization and proceedings of the bodies thus particularly alluded to.

The remarks made by Mr. Adderley in presenting his Public Health Bill, would appear to prove that really some such examination of the scientific advisers of the Government is necessary. He said distinctly that the meaning of one of the clauses in that Bill was to confer upon that unconstitutional body, the Privy Council, the power of enforcing an universal system of vaccination, under pains and penalties such as before were only applied by the authority of Special Acts of Parliament. Now, it is notorious that the opinion of the danger of vaccination in many cases, and of its inefficacy in others, is gaining ground among medical men of the Continent. Some years since, innoculation was compulsory by Act of Parliament; but now it is punishable by the same authority. So that it is by no means improbable that Mr. Adderley and his friends are about to renew the blunder of the Administration of former days; and thus again to compel the public to adopt a system of preventive treatment, which may ultimately be found to be so injurious as to require legislative prohibition. At any rate, the uncertainty which overshadows the subject is sufficiently great to render it dangerous to allow any interference with the the liberty of the subject; and certain we are that public opinion, in all these matters, is a safer and a better guide than any Board of Health, or any Committee of Council. But what is to be said for the scientific advisers of the Government when they take no steps to obviate the uneasiness created by the violent discussions as to the use of vaccination? Long since an inquiry of a real, *bond fide* character ought to have been made into the question; at present it is involved in sad doubt and obscurity.

There seems little reason to hope that Mr. Adderley will adopt a wiser course in this matter than his predecessors have done, for he evidently is striving to perpetuate the policy they introduced, not only by means of the Bills he presents to the Legislature, but also by his mode of dealing with those Bills. Even the conduct he has lately thought proper to adopt with respect to the Local Government Bill bears evident traces of the care with which he has studied the tactics of the representatives of the "Cabal" in the minor departments of State. The Bill was hurried through its first stages, so as to avoid discussion, on the pretence that it would be discussed in Committee; now, it has been re-committed, with amendments, which may, as in the case of Sir B. Hall's Public Health Bill, 1855, essentially alter the character of the measure allowed to be presented. We would ask, if Bills be thus altered in the subsequent stages of their progress, what is the use of the form of the first and second readings before reference to Committee? There is actually no guarantee that by subsequent amendments (smuggled in, perhaps, in a thin morning sitting, or late in the evening, when attention is not to be expected), the real principles which have been sanctioned by the House on the first and second readings of a Bill, may not be entirely set aside. Is it not the duty of the Speaker to put a stop to this dangerous course of proceeding? Of course, in these remarks, we only allude to the general, constitutional question involved; for we have not been able to obtain copies of the proposed amendments to Mr. Adderley's so-called Local Government Bill.

Works for public improvement are, however, suffering much from the uncertainty of our legislation, and the incessant interference of our lawmongers with the operations of private enterprise. We hear of few undertakings in England for the purpose of water or gas supply, or for other permanent operations of a similar character; nor, indeed, is it likely that capitalists should be disposed to invest their money in securities of this kind, since neither parliamentary or parchment titles are safe from the attacks of Socialist Reformers. Even the purchased rights of the Livery of London are about to be confiscated by Mr. Adderley's colleagues; so that it must cease to be matter of surprise that public confidence should be withdrawn from investments which are exposed to similar attacks. The great question of the Metropolitan Drainage drags its slow length along, thanks to the officious intermeddling of Sir B. Hall; and it seems to be as far from a solution as ever. Perhaps Mr. Goldsworthy Gurney's Committee may throw some light upon the subject of the best mode of dealing with the Thames, particularly when the committee has got beyond Mr. Gurney's nonsense; for it is worthy of remark that, in detailing his plan for obviating the inconvenience arising from the deposit of mud, that gentleman has displayed an amount of ignorance of the laws of hydrodynamics worthy of an Admiralty Surveyor. There are men, however, on this committee who ought to take the opportunity of removing such important matters as the state of the Thames from the hands of empirics, or of mere enthusiasts; and it is in the name of the engineering profession that we call upon the President of the Institution of Civil Engineers, especially, to place this inquiry upon its proper footing—to make it advance in some way the scientific reputation of the profession to which he belongs, but which has been so sadly disgraced by the official investigations and proceedings of late years.

In other quarters we only hear of the continued efforts of the Rugby Local Board of Health to remedy the failures of its boasted water supply. The pot-piped gathering grounds have, indeed, there failed as signally as they did at Sandgate; and we are curious to know the explanation Mr. Chadwick can give of

the bursting of this additional bubble of his manufacture. Be this as it may, the boring undertaken at Rugby is now 650 feet from the surface, and is being carried on in the gypsums and marls of the new red sandstone. We hear also marvellous things of electric lights and of their economical application, but we still expect tangible results from the various methods proposed for effecting the desired object. Meanwhile, the Amsterdam Water-Works are advancing steadily and surely in public favour and in prosperity, whilst the only other English Water Company on the Continent that we know of, the Berlin, seems to be in a very bad position. "Comparisons are odious," says the proverb; so we content ourselves by saying that the Amsterdam Water-Works, in spite of all predictions, did not experience any deficiency in their supply throughout the long drought of last summer; that they made 1121 new contracts in the financial year; and that they divided 5 per cent. on their new, and 1 per cent. on their old capital, or, on the average, about 2½ per cent. on the whole. All things considered, this is very creditable to the present direction, and it promises well for the future. As English investments are so dangerous, why do not capitalists go abroad?

MANCHESTER CORPORATION WATER-WORKS.

The proceedings in Parliament with respect to the Bill lately presented by the Corporation of Manchester under the above title, have been of a very extraordinary nature, and, indeed, such as to inspire serious anxiety to those who are really desirous of retaining the Local Government Englishmen prized so highly. In order to explain the bearings of these proceedings, it may be advisable to notice their preliminary history, and then to call attention to some of the evidence given before the Select Committee of the House of Commons, to which the Bill was referred; and this may be done as follows.

The Manchester Corporation, by their Water-Works Act of 1847, are only empowered to levy a domestic rate for their water supply, and this rate is a uniform per centage on the rental of the several dwelling-houses within their jurisdiction. Under this system, there are not less than 51,000 tenements rated on the average at 2s. 3½d. per house per annum, and 14,939 tenements rated on the average at 10s. 8d. per house per annum; and, as might have been expected, the corporation have found that the amount of money so raised is totally inadequate to meet the expense of obtaining and distributing the water. They therefore sought permission to levy a *minimum* rate of 5s. 3d. per house per annum (for every house receiving the water directly), and to charge an additional sum of 10s. for every water-closet supplied. Some petitions were presented against the bill, but before going into committee the real opposition was withdrawn. The bill consequently went before the Committee upon Unopposed Bills; but there, Mr. Fitzroy appears to have considered that the new provisions involved some modification of the recent legislation upon sanitary matters, and he therefore caused the bill to be sent before a Select Committee, composed of the Hon. Mr. Cowper, Sir G. Montgomery, Messrs. Howard, Allcock, and Foster. Before this committee the Manchester and Salford Association, which had presented a petition against the bill of so informal a character that it could not be even referred to the committee, was allowed to give evidence, and its witnesses were examined in what appears to us to have been so unfair and prejudiced a spirit, by parties whom it might be dangerous to mention by name, as at once to convince every person present during the inquiry that a foregone conclusion existed amongst those who were supposed to investigate the justice, or the injustice, of the details of the measure. The consequence was, that the clause of the proposed bill, by which the Corporation of Manchester sought to levy a charge for the supply of water-closets, was disallowed; and avowedly so, because the majority of the committee considered that the effect of the clause would be to discourage the use of that description of machinery.

Now it appears to us very unfortunate that amiable enthusiasts, or obstinate theoricians, should at any time be able to force their crotchets upon people possessing the greatest amount of local and technical knowledge of the circumstances involved in any discussion of the kind to which we refer; and in this Manchester case especially it seems to us that there was singular inappropriateness in the interference of the Sanitary Reformers. It is notorious that the poorer class of householders are not capable of dealing with the machinery of water-closets with the care and attention necessary to keep them in order, or to prevent the waste of water from them. At Manchester, however, this class of householders bears an unusually large proportion to the rest of the community; so that, in fact, any unnatural encouragement to the use of water-closets in that town is a direct encouragement to the waste of water. But, although this must always be an important consideration in a district wherein water is extremely costly to obtain, and, afterwards, is of great commercial value, there is another consideration affecting the question which does not appear to have attracted the attention it merited during the Parliamentary inquiry — namely, if water-closets be adopted generally in Manchester, how is the sewerage to be disposed of at the outfall? In the Metropolis itself, where the sewerage is poured into the mighty stream of the Thames, it has, nevertheless, become a nuisance of so gigantic a nature as to require the most energetic treatment. At Manchester, the difficulties attending the disposal of sewerage refuse must be increased tenfold, on account of its inland position and of the insignificant and peculiar character of the streams which traverse the town. "*En toute chose il faut regarder la fin*," says the fabulist; but the Sanitary Reformers take no heed of such common-sense maxims. They say, practically, "Encourage, by all means, the removal of sewerage matters by the agency of water, leaving to chance the decision of all questions attending its ultimate disposal;" and thus the Corporation of Manchester must either find themselves involved in countless law suits with the neighbours of their outfall works for the town sewerage—as at Croydon, Hitchin, Chelmsford, Southampton, Luton, Stratford-upon-Avon, Uxbridge, Rugby, &c.—or they must at once undertake the erection of deodorizing works on an analagous scale to those of Leicester. One of the most serious errors of the General Board of Health hitherto has been that it has urged the indiscriminate application of the water-closet system, without any reference to local circumstances; and it has thus created a series of concentrated nuisances of far more destructive a character than that of the smaller local nuisances in the shape of cesspools. The lessons of the past do not seem to have opened the eyes of these empirics; and, unfortunately, they have sufficient power and influence to thrust their mischievous dogmas upon those who are in no wise anxious to accept their guidance.

It is curious, however, that the Manchester Corporation should be made thus to feel the influence of Red Tape. Will other corporations derive any benefit from the fate of their colleague? They may depend upon it that, if the Local Government Bill pass in its present form, they will no more be allowed to conduct their own business as they think proper than the Manchester Corporation has been allowed to fix the tariff of the water supply.

We cannot close these remarks without recording a most distinct protest against the extraordinary statements made by Mr. E. Chadwick before the Committee on the Manchester Corporation Water-Works Bill; for they contained what we do not hesitate to call such wilful tamperings with truth, as to render the decision arrived at, mainly in consequence of those statements, more than usually unsatisfactory. That retired functionary actually asserted, amongst other equally strange things, that the Superintending Inspectors of the Board of Health never executed sewerage works. He actually said that the Croydon epidemic took place *whilst* the works were being carried out; and that the mortality in Croydon had been only 15·92 in the year 1857! It would be ridiculous to waste time in exposing the fallacy of the two first of the above statements; for, in the first place, so notorious was the jobbery of the officials of the General Board of Health, that even Sir B. Hall himself stigmatized it in his place in Parliament in such terms as to prove either that he or Mr. Chadwick must have deceived the Legislature; in the second place, it is notorious that the Croydon epidemic took place long *after* the works were completed—not during their progress. As to the mortality of Croydon, we find, from the Registrar-General's Returns, that in the years ending respectively on the last day of March in 1856, 1857, and 1858, the mortality was 659, 649, and 669; or at the rates of about 20·06, 19·78, 20·39 in the 1000, calculated upon the census of 1851. No doubt it would be necessary to make a correction in these rates on account of the increase of population; but we are convinced that it is impossible that the increase can have been such as to warrant any belief in Mr. Chadwick's statistics. Yet men able to make statements of this description are the chosen and trusted guides of our governing class, and the corporations of such towns as

Manchester are coerced into accepting the crotchets of these men in matters of purely local importance!

It is worthy, also, of remark that Mr. Chadwick now asserts that pipe-sewers are only self-cleansing when laid with a fall of 1 in 60. Formerly, the inclination of a pipe was a condition of little moment in the eyes of this amateur Engineering Empiric. It must be a matter of some gratification to the public thus to find that even he is able, after countless failures, to see some of the errors of his theories.

ON SOME RECENT HYDROGRAPHICAL DISCUSSIONS.

THE report by Captain Alldridge upon the complaints of the owners of the loading stages on the banks of the Usk has lately been published, and it is about as unsatisfactory a document as we have ever seen issue from that most unsatisfactory department of the public service, the Hydrographical Board of the Admiralty. No attempt whatever is made in the report to investigate the physical laws of the tides, or of the littoral currents of the district which gave rise to the inquiry, as it is called by courtesy; but a very hasty, unphilosophical series of soundings and dredgings appear to have sufficed to enlighten the mind of Captain Alldridge in a case affecting the interests of a thriving community, perhaps to a most serious extent. On the strength of this very incomplete examination, the gallant captain has, however, arrived at a decision worthy of Sancho Panza or of the renowned Wouter von Twiller himself; for he concludes by stating that the proceedings of the Dock Company, in discharging the mud dredged from their basins into the river, have not done any mischief, but that in future they ought not to be allowed "to do it again!" How long are we to be exposed to such ridiculous scientific reports? and in the days of competitive examinations, too, be it observed, these curious illustrations of official shortcomings seem the most to abound.

In fact, the river Usk discharges into the arm of the sea forming the embouchure of the Severn, and it does so nearly at right angles to the axis of the main stream. The advancing flood tide-wave of the Severn must, therefore, find at the mouth of the Usk a reach of comparatively still water, into which the alluvial matters it carries forward must be drawn, either to be deposited in the form of a bar if the velocity of the tide-wave of the Usk should not be sufficient to retain them in suspension, or, otherwise, to be carried into the upper reaches of the river. The flood of the Usk is, however, only derived laterally from the great flood-wave of the Severn; and the ebb of the latter must always set across the ebb of the smaller stream, and thus retard its velocity at certain periods of the tide, when the alluvial matters in suspension in the river waters must be thrown down to a greater or less extent. In almost all tidal rivers discharging into funnel-shaped estuaries there is a tendency to silt up, because the flood-tide carries forward more alluvial matters than the ebb is able to remove. But this tendency must be greater in the cases of subsidiary rivers, wherein the the alternate oscillations of the tides are interfered with by the flow of the main stream; and it therefore appears to us that Captain Alldridge has displayed a want of knowledge of the ordinary laws of Nature when, firstly, he says that the discharge of dredged mud into any part of the Usk is a matter of indifference; and, secondly, when he says that in future such mud should be discharged near the lighthouses at the mouth of the river.

We, ourselves, believe that the real remedy to the evil produced by the Dock Commissioners of Newport will only be obtained by indicting them for a public nuisance, and by carrying the suit into the superior courts of law. The Admiralty authorities are either not able or not willing to study the complicated phenomena which affect such questions, as the one involved in the case under consideration, with the attention they require; nor would any further proof of this disinclination or incapacity be necessary than a reference to the fact that Captain Alldridge only devoted three days to his inquiry. Of course, any such suit would be attended with great expense, and the proprietors of the loading stages must weigh well the possible outlay and the possible advantage to be gained; but we are convinced that it would be easy to substantiate in any court that, *pro tanto*, every barge load of mud cast into the Usk, or near its embouchure, must interfere with the navigation of the river. Captain Alldridge's Report has settled no controverted point; it ought to satisfy neither of the parties concerned; for, after all, the Dock Commissioners are ultimately as much interested as the owners of the loading stages in preserving the navigability of the river, and they will suffer equally with their present opponents if they allow any false system to be established. For the sake of all parties, then, and in the interest of science, we may be allowed to express the hope that a further investigation of the hydrographical conditions of the Usk will at once be made.

It is worthy of remark that the engineers who have lately reported to the Metropolitan Board of Works on the Intercepting Sewers, have proved that the law we affirm generally to prevail in funnel-shaped estuaries actually applies in the Thames. This was a valuable confirmation of the views expressed by M. Marchal in the papers we translated and inserted in the Nos. 103 and 105 of this JOURNAL for the year 1856; and the authority of such men may fairly be urged against the lame and impotent conclusions of the Admiralty Surveyor. At the same time that we say this, we cannot refrain from remarking that it is strange that even in discussing so grave a political question as the Suez Canal, no one hitherto appears to have dwelt upon the existence of the laws which regulate the distribution of alluvial matters moved forward by the sea. The most valid argument against that wild and visionary project is, we are convinced, to be found in those laws, which would render it physically impossible to keep open any port to be formed at the extremities of the Canal, even if for argument's sake we assume that the latter could be made at any reasonable cost. There is, indeed, a constant accumulation of alluvial matter at the head of the Red Sea; and as to the shores of the Mediterranean, it is notorious that there is also a constant accumulation of the same kind taking place on nearly all parts of the shore of Egypt and of Syria. As Englishmen are eminently practical, these considerations may be too speculative, perhaps, to fix their attention. But the laws of Nature are not like Red-tape laws: they will work—and they must be attended to at our peril.

Circular to Gas Companies.

THE members of the committee appointed to inquire into the gas supply of the metropolis have, after more delay, been nominated. The committee consists, as we before stated it would, of fifteen members; of whom five have been nominated on behalf of the metropolitan parishes, five on behalf of the gas companies, and five have been nominated by the Government. The names of the members and the places they represent are as follow:—

Mr. Byng, *Middlesex*, Sir B. Hall, *Marylebone*, Sir J. Shelley, *Westminster* Mr. Roupell, *Lambeth*, Mr. John Locke, *Southwark*,	Nominated by the Metropolitan Parishes.
Sir W. Hayter, *Wells*, Mr. F. W. Russell, *Limerick City*, Mr. Thomas Mills, *Totnes*, Mr. Jackson, *Newcastle-under-Lyme*, Mr. Whitbread, *Bedford*,	Nominated by the Gas Companies.
Mr. Mowbray, *Durham City*, Alderman Cubitt, *Andover*, Mr. Adams, *Boston*, Mr. Barrow, *Nottinghamshire* (*S.*), Sir W. Dunbar, *Wigton-burghs*.	Government Nominees.

We must confess to some disappointment at the absence from the list of such men as Sir James Duke, Mr. Salisbury, and others well known to have a large stake in gas property, whose practical knowledge of the details of the manufacture would have materially assisted the inquiry.

The committee met for the first time on Friday last, to appoint a chairman and to arrange the order of proceedings, but they sat with closed doors, and what occurred has not transpired, further than it is understood they are to meet on Thursday next for the commencement of business. We hear, however, from various sources, accounts of what has been doing on the part of the metropolitan delegates and of the gas interest which argue unfavourably for a satisfactory termination of the inquiry, either to the companies generally or to the public, for the protection of whom the committee has nominally been appointed; and we think it right to caution both parties to be vigilant lest their respective interests should be sacrificed by the perpetration of a job.

The danger of such a result of the noisy agitation against the districting arrangements of the gas companies is, indeed, appa-

rent in the resolutions drawn up by the delegates as a manifesto of their grievances, and as an embodiment of the objects they desire to obtain. The most novel and the most important of the proposed enactments is the one for establishing two standards of quality, each with its separate maximum price. A provision to give the companies the power, and stimulate them to improve the quality of their gas, would be excellent in principle, and would, if sufficiently high standards were insisted on, have a direct tendency to raise the illuminating power of London gas; but, if low standards were adopted, it would prove almost fatal to the hope of seeing the metropolis lighted in a manner worthy of its rank and importance as the commercial capital of the world. There is no point on which we have ever more strongly insisted than on the benefits which gas companies and gas consumers would derive from the supply of a superior article at a comparatively high price, in preference to an inferior one at a price nominally low, but really requiring the expenditure of a larger sum for an equal quantity of light. We have seen with pleasure the measures adopted in furtherance of this principle by the Western, the Chartered, the Equitable, and the City Gas Companies, but all hope of London ever rivalling other great cities of the kingdom in the brilliancy and beauty of its illumination would vanish if the proposed 18-candle standard of the metropolitan delegates were to be adopted. If such an enactment were in force, it would indeed have the tendency immediately to deteriorate the quality of the gas at present supplied to the western district of the metropolis, which is generally understood to be greatly superior to the standard required by the delegates. In the evidence given by Mr. Wright, the engineer of the Western Gas Company upon the Imperial Company's Bill in 1854, he stated distinctly that the illuminating power of 5 cubic feet of the gas supplied by his company at that time was equal to from 27 to 30 sperm candles, and that it was produced either entirely from cannel coal or from a mixture of Boghead cannel and Newcastle coal, for which gas the charge was 6s. per 1000 feet. Whether the Western Gas Company have supplied the inhabitants of Belgravia with gas of that high illuminating quality to the present day we will not undertake to say, but it is quite evident that, if the enactments proposed by the metropolitan delegates should become law, that company would be empowered to lower the illuminating power of their gas more than one-third below their standard in 1854, and the charge upon the public would be increased in the same ratio.

We cannot conceive how the learned chairman of the meetings in Marylebone Court House could have had his mental vision so far distorted as to propose or consent to a resolution which would be, if carried into effect, so prejudicial to the public. There are, however, indications, to which we will not further allude, that Western influences have been brought to bear on the action of the delegates, which would account for the introduction of the 18-candle standard into the proposed enactments. By "putting this and that together," and seeing how greatly one of the principal resolutions proposed by the delegates would tend to the advantage of the Western Gas Company, whilst it would be decidedly prejudicial to the interests of the gas consumers, the suspicion is engendered that some jobbery is being carried on against which the gas companies generally and the gas consumers should be on their guard. If the agitation against the districting arrangements of the metropolitan gas companies should end in limiting the improvement in gas to an illuminating power of 18 sperm candles, and in raising its price for the street lamps to that paid by private consumers, the inhabitants of London will have little reason to be grateful to the parochial agitators who have undertaken to protect their interests. And as regards the gas companies, whilst the Western would rejoice in the addition of at least £10,000 to their income, the gain of the other companies would be limited to an increased charge on the public lights, accompanied by restrictions to a low price for gas of a comparatively low quality.

We have constantly upheld the interests of the gas consuming public against all combinations to their prejudice, and at the cessation of the active competition between the Western and the Imperial Companies, at the close of 1854, we warned all parties against abusing the power which their improved position conferred by relaxing their efforts to accommodate their customers, or by withholding any of the advantages enjoyed by them during the time of competition. Our observations at that period are equally applicable to the circumstances of the present day. In the January number of our JOURNAL of 1855, when remarking on the increased value of the shares of the principal old-established companies during the preceding year, and on the more peaceful relations among them, we observed:—

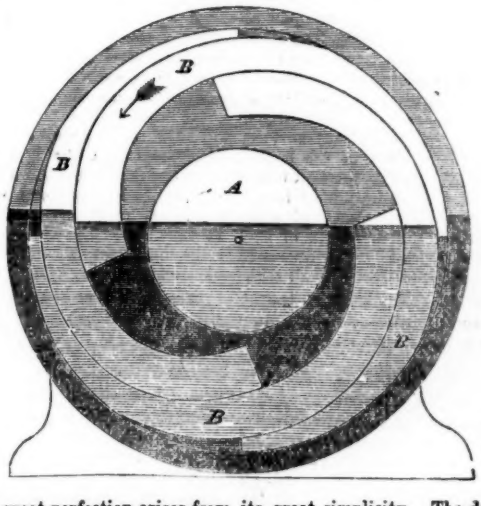
"It is, however, to be hoped that the lessons of the past will not be lost upon the future; that the readiness with which complaints have been redressed will suffer no diminution now that active competition has almost ceased; that pure gas will be supplied in abundant quantities to all who may desire to consume it, and that its quality will undergo no deterioration. It is in evidence [given by Mr. Wright] that, in 1854, a light equal to thirteen standard sperm candles would be yielded by the hourly combustion, in suitable burners, of 2½ feet of the Western (cannel) gas, of 4 feet of the Imperial (Fulham) gas, and of 5 feet of the ordinary gas of the other companies; and we rely with confidence upon these standards being rigorously maintained, or, at all events, not lowered, to the prejudice of the gas-consuming public."

It was in the spirit of that article that when, on the commencement of the districting arrangements, one of the most powerful of the London gas companies raised the price for lighting the public lamps, and gave other indications of exercising their newly-acquired monopoly to the prejudice of the consumers, we protested strongly against the injustice and impolicy of that course of conduct, and urged the adoption of liberal and conciliatory measures in effecting a change that was calculated to benefit the gas consumers as well as the companies. We were inclined, at first, to look favourably on the demonstration of public feeling which had been roused by this threatened oppression; but when the question became the stalking-horse for parish agitators to display their loquacity, and to puff themselves into notice, and the real requirements for the protection of the public interests were mixed up with matters put forward to excite prejudice, based on ignorance and misrepresentation, our sympathies with the agitation gave place to the distrust with which we are accustomed to regard such movements in general. However laudable the objects proposed to be accomplished, it most frequently happens that the men who profess to promote them have merely their own interests in view, and the agitation begun with a patriotic purpose too often ends in nothing but individual gain and public injury. The agitation of the metropolitan parishes against the districting arrangements of the gas companies will be no exception to the general rule if the course towards which it is tending be not vigorously resisted.

Correspondence.

CLEGG'S NEW PATENT HYDRAULIC GAS-METER.

This meter is upon an entirely new plan, and the mathematical and scientific principles are so perfectly blended in its construction that, when in operation, it literally cannot err; and, without presumption, it may be confidently affirmed to be the only meter extant that can be relied upon to measure correctly, and for giving a steady light. By the use of this meter, therefore, the endless disputes between the gas companies and consumers about the quantity of gas registered will be at an end.



Its great perfection arises from its great simplicity. The drum (as seen in the section) consists of four eccentric chambers or vessels (*B*), which are alternately filled with water and gas, and discharge a certain given quantity of gas at each revolution, which is registered in the usual way.

These vessels scarcely obstruct the motion of the drum through the water, and the weight of the drum is counterbalanced by an

air-vessel (*A*), of such a capacity as to displace a column of water equal to the weight of the drum; this causes the drum to rise or fall as the water rises or falls, and by this means the water *inside* the meter (which is the true measuring point) is always at the same distance from the chambers, whatever the pressure of the gas may be. This allows the chambers to be made in a more simple form than when constructed purposely to answer the same object.

The same motion of the drum shuts off the gas when the water in the meter-case is too low, obviating thereby the necessity of a separate float for that purpose, such as is now in common use.

The drum revolves with a minimum of resistance, and little friction; this allows the drum to be made of the strongest material, without increasing the friction on the axis. A meter so constructed will continue in good order for twenty years.

In practice, comparing this meter with the old ones of the same capacity and working at the same pressure, it is found to revolve about twice as fast, the lights remaining steady; consequently, what is called a ten-light upon the old construction, is by the new converted into a twenty-light, the twenty-light into a forty, and so on for all sizes.

The great importance to gas companies of station-meters being made upon this plan cannot be overrated, as they will not only indicate the exact quantity of gas annually manufactured, but enable correct experiments on a small scale to be made upon the different qualities of coal; and the slight pressure required to drive the drum is, to a station-meter, an immense advantage.

An inspection of the new hydraulic meter is necessary fully to comprehend its merits; it is an unquestionable boon to the gas world, combining as it does correctness of measurement, steadiness of light, durability, and economy of construction.

SAMUEL CLEGG.

Dover Cottage, Putney, June, 1858.

CAUSES OF THE VARIABLE ILLUMINATING POWER OF COAL GAS.

By Professor WM. E. A. AIKEN, *Maryland University.*

(Read at the Twelfth Meeting of the American Association for the Advancement of Science.)

In common with a large number of our citizens, my attention was directed, some short time since, to a somewhat sudden, inexplicable, and enormous increase in the amount of our quarterly bills for gas consumed—an increase equal at times to an advance of 100 per cent. over the corresponding quarter of the preceding year. As it would have been absurd to suppose a simultaneous derangement of all the meters over an extensive district, it was obvious that the difficulty could not be in any error in the registry of the gas, but in its illuminating power, necessarily requiring the consumption of a greater bulk of gas to produce a given quantity of light. Feeling that I had been, with many others, the subject of a most successful scientific operation, I had great curiosity to know how the thing had been done, and set myself to work to ascertain, if possible, what causes could be acting to diminish the illuminating power of the gas.

It has long been known that the quality of the gas produced from the fat coals is very materially influenced by the circumstances of the decomposition. In the elaborate experiments made some years ago on a most extended scale by Hedley, the British engineer, as detailed in his report to a committee of the House of Commons, we find this subject most satisfactorily discussed. Below a cherry-red heat the product obtained by heating coal in close vessels contains hardly any illuminating material. At that temperature it is furnished most freely, but, after having been formed, is liable to decomposition, involving a loss of carbon by contact with any highly-heated surface in passing through the apparatus, such decarbonization increasing with the degree of heat, with the extension of the red-hot surface, and with the time of contact. Again, the duration of the heat is most important, the best gas coming over during the first hour, the quality rapidly deteriorating, until, at the expiration of four hours, the product is worth very little to the consumer, and after five hours may be considered worthless. But the bulk of such worthless gas that can still be obtained by pushing the process to completion is very considerable, equal sometimes to 2·5 of all that passes over.

How far any neglect in the observance of the precautions required to produce a proper illuminating gas, how far such neglect may explain the result the public have no means of knowing. All that we know is, that the manufacturers furnish an article which they say is the right article, and prepared in the right way, and possessing an illuminating power varying from 14 to 17 candles. That is, their engineer reports, that on trial with a photometer, at stated times, the gas burning from a jet consuming 5 cubic feet per hour, gives an amount of light equal in the average to that of 15 patent candles, 6 to the pound. The patent candle being ostensibly a mixture of spermaceti and wax. Assuming as true all that is claimed by the manufacturers, it can still be shown that the gas, even if properly made and correctly tested, may be and is furnished to the consumer in a condition of greatly diminished illuminating power, compelling the consumption of a greater bulk to obtain the required light, and consequently swelling the record of the meter, and the sum total of the quarterly bills. In my trials to determine the specific gravity of our gas by weighing a globe previously exhaused, and then filled with it, I obtained a result ranging from ·570 to ·580, somewhat below that given as characterizing good gas. But, in reality, I attach very little importance to this result, since the mere specific gravity of such a complex mixture as coal gas can hardly be relied on to determine its commercial value.

Although good gas certainly has a higher specific gravity than poor, yet the difference could not be taken to represent the true difference in value, since the principal components of the mixture,

$$A,\ CH,\ CO,\ \text{and}\ C_{2}H_{4},\ C_{4}H_{8},$$

and still heavier hydrocarbon, having specific gravities widely different, might vary somewhat in their relative proportions sufficient to affect the illuminating power without, at the same time and to the same extent, affecting the specific gravity. The action of chlorine in removing the olefiant gas and other more dense hydrocarbons, the principal light-giving materials of the coal gas, showed a per centage of these substances never exceeding 10 per cent.; but, not having time at the moment to guard against all sources of error in the process, laid it aside. My attention was principally directed to the simple inquiry, to what extent will the illuminating power of the gas be impaired by keeping it in contact with water for noted periods? That it does deteriorate when thus kept, or when kept in contact with oil, or even in close vessels, has been long known.

Dr. Ure tells us that gas from oil, when first made, and with a specific gravity of 1·054, will give the light of one candle when burned from jets consuming 200 cubic inches per hour. But keep the gas three weeks, and then, to get the same light from the same burner, you must supply 600 cubic inches per hour. He adds, that with coal gas the deterioration appears to be more rapid; for if such gas, when first made, will give the light of one candle by the consumption of 400 cubic inches per hour, when kept four days, will require the consumption of 460 cubic inches per hour to give the same light. My first attempt to obtain some definite results began on the evening of the 8th ultimo, when I filled a large receiver from the street main, and placed it on the shelf of the pneumatic trough; the next evening I filled a second one, and put it alongside of the first; the following evening I filled a third receiver, and still the following evening, the 11th inst., I filled a fourth receiver. On the evening of the 12th I was thus provided with four jars of gas, one of which had been standing 24 hours, or one day, over the pneumatic trough. This I will call No. 1. Another, No. 2, had been standing two days; No. 3 had been standing three days; and No. 4 had been four days in contact with the water. The diminution in volume by such exposure was indicated by a receiver graduated to cubic inches, into which I introduced 130 cubic inches of gas on the evening of the 8th. On the evening of the 12th this had lost about 10½ cubic inches, indicating a loss of about 8 per cent. of the original bulk.

The effect produced on the illuminating power of the gas by the loss of volume became at once apparent as I proceeded to contrast the value of the flames furnished by the contents of the several receivers, 1, 2, 3, and 4. I used for this purpose the ordinary photometer arrangement, taking the relative intensity of the shadows produced as a measure of the relative intensity of the light. The candle employed for the comparison was the patent candle already referred to, and the burner was the kind known as the fish-tail burner, which had been previously gauged, and known to consume a trifle more than five cubic feet per hour, with the average maximum pressure of the gas-works. I need hardly add that the burner was the same in all the trials, and occupied exactly the same position. The burner and the screen on which the shadows fell were not moved at all during the experiments. The only adjustment wanted was to bring the candle nearer to or farther from the screen; and by beginning with the most luminous gas the adjustment became simply a gradual withdrawal of the candle.

The capped receiver from which the gas was passed floated freely in a large glass jar, supported in an erect position by the perpendicular sides of the jar, its own weight, with all attachments, making a difference of level between the water around it and that within equal to 3½ inches, a little exceeding the ordinary evening pressure in the gas-pipes. This difference of level, and consequently the pressure on the escaping gas, was kept uniform by the spontaneous sinking of the receiver as the gas was consumed, a flexible tube communicating between the stop of the receiver and the gas-burner. This arrangement gave me a steady equable flame, which continued perfectly uniform long enough to enable me, after a few trials, to note very exactly its true value. The results at first obtained were too startling to be at once believed, but subsequent repeated trials satisfied me that they were very close approximations to the truth. The first trial was with the gas from the street main, which I found equal to 10·71 candles. The same gas, transferred from the pipe to the capped receiver, and burned immediately, gave exactly the same power, 10·71 candles. Gas No. 1 was next used, and found equal to only 3·50 candles; gas, No. 2, after standing two days, gave the light of 3·20 candles; gas No. 3, three days old, was equal to 1·90 candles; and gas No. 4, four days old, gave the light of 1·75 candles—these quantities representing the average of repeated trials.

It thus appears that the illuminating material of our coal gas is so rapidly abstracted by suffering it to remain in contact with water,

that the same volume of gas which to-day will give me the light of nearly 11 candles, by standing until to-morrow will give the light of only 3½ candles, and if left standing four days will give the light of only 1¾ candles, while the only means left to the consumer to get the light he requires from this deteriorated gas is to burn more of it, as we have all been doing through the past winter. If we now take into account the well-known fact that gas of less illuminating power has less density, that gas of less density passes more rapidly through a given aperture than gas of greater density, we have another cause operating to increase the consumption. In Hedley's experiments, the argand burner which gave the light of 25 candles when supplied 3 cubic feet per hour of gas from Welsh cannel coal, with a specific gravity of 737, required no less than 7½ cubic feet per hour to give the same light, from the same burner, when the gas was made from the Newcastle coal, and had a specific gravity of only 475.

Again, as we diminish the illuminating power of the gas, we increase its heating power, and this necessarily brings with it a higher temperature given to the burners, a higher temperature given to the gas passing through them; and, again, an increased rapidity in the flow. It is thus manifest that the public are placed in a peculiarly unfortunate position, since all the mistakes that are likely to occur in the process of manufacture are mistakes that must inevitably increase the bills of the consumer and the profits of the manufacturer. If the workman fails to raise the heat with proper rapidity, if he overlooks a retort and allows the heat to continue a little too long, if toward the close he allows the heat to rise a little too high, the result is inevitable—the product is deficient in illuminating power; or, if on any one day a little more gas is produced than is legitimately required, the surplus remains in the gasometer to vitiate the supply of to-morrow. To what extent this vitiating action operates, may be inferred from the fact that I have never been able to obtain from the gas of our pipes an illuminating power equal to the minimum of that reported by the engineer of the gas company. In my trials, the power has varied from that of 13 candles down as low as that of 9 candles, instead of ranging from 14 to 17 candles.

This difference is perfectly intelligible if we assume the last quantities to represent the value of the gas when first made, and my results to represent its value as delivered to the consumer. In conclusion, I would merely add, that the difficulty suggests its own remedy. And that would be to have a standard of quality established by the proper authorities, testing the illuminating power as the basis of the calculation, and then to have the requirements of such standard insured by a nightly examination, if necessary, on the part of some one entirely disconnected with the manufacture. In other words, the photometer can be made as available and as valuable to the consumer of gas as the hydrometer is to the spirit merchant. As he distinguishes with his instrument in any mixture, between the spirit he wishes to buy and the water he is unwilling to pay for, so the consumer of gas can distinguish with the photometer between the true illuminating material and the worthless heat-producing gases, hydrogen and light carburetted by hydrogen, that make up the bulk of the ordinary coal gas.

Register of New Patents.

PROVISIONAL PROTECTION

HAS BEEN GRANTED FOR THE UNDERMENTIONED PATENTS.

1028.—Charles Botten, jun., of Clerkenwell, London, engineer, and Nathaniel Fortescue Taylor, of Stratford, Essex, gas engineer, for "*Improvements in means or apparatus employed in measuring and in regulating the flow of gas and other fluids.*" May 7, 1858.

1037.—George Day, of the parish of Old St. Pancras, London, coppersmith, for "*An improved self-acting valve for regulating the flow of liquids.*" May 8, 1858.

1062.—John Henderson, of Glasgow, in the co. of Lanark, N.B., druggist, for "*An improved apparatus for measuring fluids.*" May 12, 1858.

1068.—Joseph West, brass-turner, of 234, Shales Moor, Sheffield, in the co. of York, for "*A mode of covering and securing water-taps and branches.*" May 12, 1858.

1099.—Charles Weightman Harrison, of Woolwich, in the co. of Kent, civil engineer, for "*Improvements in obtaining light by electricity.*" May 17, 1858.

1107.—Alexander Angus Croll, of Coleman Street, London, engineer, for "*Improvements in the treatment of sulphate of alumina and in obtaining alum.*" May 18, 1858.

1117.—Charles Middleton Kernot, of Gloucester House, West Cowes, Isle of Wight, M.D., for "*Improvements in distilling shale, boghead, and other mineral matters.*" May 19, 1858.

1133.—John Adamson, of St. John Street Road, London, mechanic, for "*Improvements in the manufacture of parts of gas-meters.*" May 21, 1858.

1145.—Frederick George Underhay, of Wells Street, Gray's Inn Road, and Josiah Latimer Clark, of Haverstock Hill, Hampstead, both in the co. of Middlesex, for "*Improvements in cocks or taps, and in apparatus for flushing.*" May 22, 1858.

NOTICES HAVE BEEN GIVEN OF INTENTION TO PROCEED WITH THE UNDERMENTIONED PATENTS.

51.—Charles Barlow, of 89, Chancery Lane, London, for "*An improved registering water-meter.*" Jan. 13, 1858.

76.—Edwin Hills, of Warsash, in the parish of Tichfield, in the co. of Southampton, merchant, for "*An improved process of manufacturing sulphate of ammonia.*" Jan. 16, 1858.

895.—Thomas Greenshields, of No. 11, Little Tichfield Street, London, for "*Improvements in purifying gas produced from coal, and obtaining ammoniacal and other alkaline salts.*" April 23, 1858.

930.—James Henry Bennett, engineer, 8, Vamburg Place, Leith, in the co. of Edinburgh, for "*An improved arrangement of safety-valves for steam, gas, or any other aeriform or liquid body.*" April 27, 1858.

995.—William Ross, of Glasgow, N.B., brass-founder, for "*Improvements in taps and valves.*" May 5, 1858.

Parliamentary Intelligence.

BRADFORD CORPORATION WATER-WORKS BILL.

TUESDAY, APRIL 13.

(Group F.—Before Mr. Jackson, chairman, and Mr. Kershaw, Mr. Holford, Mr. Close, and Mr. Davey.)

Mr. Hope Scott, Q.C., Mr. Pickering, Q.C., and Mr. A. J. Johnstone appeared for the promoters, Mr. Venables for the corporation of Leeds, and Mr. Littler for Messrs. Ripley, inhabitants of Bradford, petitioners against the bill.

There were twelve petitions presented against the bill, but the above two only were appeared upon.

Mr. Pickering, in opening the case, said the object of the bill was to enable the corporation of Bradford, who were also the Board of Health, and to whom the water-works belonged, to extend their limits; to construct new works, and alter existing ones; and to empower them to borrow money for these purposes. The borough of Bradford consisted of four townships, Bradford, Bowling, Horton, and Manningham, and the population at the present time was upwards of 132,000. This population had increased very rapidly during the present century. In 1801 it was somewhat above 13,264; in 1851 it had increased to 103,786; and since then it had extended to the number he had stated. It was necessary that he should call attention to this very rapid rate of increase, that the committee might be able properly to understand the motives which influenced the House in sanctioning the original undertaking, and why the corporation were now before them for an extension of their powers. The town of Bradford was situated in a kind of basin, the higher districts around which were included in the limits of the water supply, and the difficulty which was consequently experienced it was one of the objects of this bill to remove. The townships of Horton and Bowling, as well as parts of the town of Bradford, were on this high level, and it was of the utmost importance that the corporation should be able to afford to them a more efficient supply than at present was in their power. It was well known that Bradford was one of the principal seats of the worsted manufacture; there were 97 mills in the town, besides enormous large warehouses and dwellings, and there were many extensive villages in the suburbs. When the population began to increase with the rapidity to which he had referred, a great want of water was experienced; and accordingly, in 1842, a water-works company was established. The scheme which they proposed was to take the water from the Manywells Springs, at a distance of about seven miles from Bradford, and in the intervening distance to construct two store reservoirs, from which the water was conveyed to the service reservoir at present in use. It was also a part of that scheme to have a compensation reservoir, as far as Hewenden Brook was concerned, the supply from which was 560,000 gallons per day. At that time, this scheme was thought to be sufficient to satisfy the wants of the population, but it was soon found to be totally inadequate, and the cry for water became so great that two schemes were brought forward in Parliament to afford a better and more efficient supply. He had forgotten to mention that the capital of the old water-works company amounted to £82,500. In the year 1853 the two schemes to which he had referred were before Parliament. One was promoted by the old company, the other by the corporation of Bradford; each prepared by different engineers, but each grounded upon the acknowledged and pressing wants of the district. A long and severe contest took place, and the committee of the House of Commons thought it better to postpone the consideration of both bills till the following year, in order that, if possible, a scheme upon which all parties could agree might be submitted to them. Accordingly, in 1854, both parties were again before Parliament, and the committee considering that the corporation were the proper persons, as representing the borough, to have the guardianship of the water supply, adopted their proposal, which embraced, among other things, the purchase of the interests of the existing company.

The Chairman: Were compulsory powers given to them?

Mr. Pickering said he believed it was done by arrangement between the parties. The scheme of the corporation for extending the supply was this: They proposed as their gathering-ground the valley of the Wharfe, at a distance of 24 miles from Bradford, covering an area of 7550 acres; and in the valley of the Aire, 2220 acres—together 9770 acres; and the estimated yield of water was 8,500,000 gallons per day. It was a part of this scheme also, to erect a compensation reservoir for the supply of the mill-owners who were affected by the taking of the water from the valley of the Wharfe. This reservoir was to be formed upon a tributary stream of the Wharfe; and it was referred to Sir William Cubitt to settle as between the mill-owners on the one hand and the corporation on the other, of what capacity that reservoir should be made. It resulted in the size being fixed, to the satisfaction of both parties, at 625,000,000 gallons, and consequently upon that point no question would now be raised. With regard to the mills on the Aire, a compensation reservoir was also provided for them, but upon that also he need not trouble the committee. The other part of the scheme, which was called the Hewenden scheme, he must now direct attention to. He had already stated that part of the arrangement was that the corporation should take the old works of 1842. The other part consisted of the corporation taking a new gathering-ground, and erecting a reservoir at Hewenden of the size of 900 acres. The water was then to be brought down by the old conduit to the Chellow reservoir, and it was proposed to carry it through the town by service-pipes, and to supply the higher parts by pressure—an inconvenient plan at the time, which had certainly not been found to answer, and which it was one of the objects of the present bill to apply a remedy to. There was also by that plan another compensation reservoir; and these were the main features to which he thought it necessary to allude. Now, a financial difficulty had arisen in carrying out these works. The corporation had power to raise, under the Act of Parliament, the sum of £450,000, for the purpose of purchasing the old company's works, taking upon themselves their liabilities, and executing the new works which he had described. They had to pay for the old company's works, £165,000. The company at that time were paying 10 per cent. dividend, and it was thought reasonable that the purchase price should be at the rate of £40 per share, which made the

total cost £165,000. The liabilities of the old company were £27,500, and the estimated cost of the necessary new works was £240,000, making together £432,500, and leaving but £17,500, a very small sum for what are called contingencies. He need scarcely mention that there were considerable expenses incurred from causes which could not be foreseen. For instance, the long, unsuccessful parliamentary contest in 1853, and the successful one in 1854, because the bill was opposed in both Houses, amounted to £25,744. The excess of expenditure in plant and distribution of pipes amounted to £24,000; the excess on the land estimate was £20,575; the law and engineering expenses £20,000, and about £15,000 in the construction of works. Without, however, going into all the detail, he might state that, in round numbers, the excess of expenditure was about £130,000. The account, as it stood at the beginning of April, showed that the corporation had already spent £360,731. 12s. 6½d., and they had incurred liabilities with reference to contracts now existing of £108,792. 11s. 3d. Those two sums together amounted to £469,524. 3s. 9½d.; and, as their powers were limited to the raising of £450,000, there was an excess in this respect of £19,524. The works, moreover, were not completed, and the scheme had not been carried out. In order to execute the remainder of the works sanctioned by Parliament, they estimated they should require £109,000; and, in addition to this, they would need for the new works he was about to describe £26,750 more, making together £155,274. What they, therefore, now asked power to raise was the further sum of £200,000, making the total capital £650,000, which would leave them about £45,000 for contingencies. The works which the corporation intended to execute were referred to in the fifth clause of the bill in these words:—"An aqueduct or conduit, commencing by a junction with the intended main aqueduct or conduit from Sandbed Beck to the intended Heaton reservoir, authorized by the Bradford Water-Works Act, 1854, near to Joy Beck, and terminating in the village of Burnsall, and a branch therefrom terminating in the said village, near to the Red Lion Inn there." This would enable them to supply water to several villages, and amongst these to Addenham and Joybeck, which would have a constant service.

The CHAIRMAN: Are there clauses in the bill to secure this?

Mr. PICKERING said there were; and it would be, he apprehended, the duty of the committee to see that they properly did secure it. The second part of the scheme was "An aqueduct or conduit, commencing in the township of Silsden, about midway between Middle Marchup and the Blackburn, Addingburn, and Cockingend turnpike road, and terminating at or near the south-east corner of the Chelker reservoir." There was a clause in the bill compelling the corporation to send out a certain quantity of water, sufficient for the mill-owners and the inhabitants of Addenham.

The CHAIRMAN: Does any one appear on behalf of the mill-owners on the stream?

Mr. PICKERING replied in the negative, and added, that he believed he was justified in assuring the committee they were perfectly satisfied. The third part of the scheme was, "An aqueduct or conduit, commencing by a junction with the aqueduct authorized by the Bradford Water-Works Act, 1854, to be made from the intended Stubden Beck reservoir to Manywells, and terminating in the Dudley Hill, Killinghall, and Harrogate turnpike road, in the township of Eccleshill, near to the Robin Hood Inn there." The various levels were these:—The Stubden reservoir was 1030 feet above the level of the sea; the Chellow reservoir, 640 feet; and the existing service reservoirs, 520 feet. The highest part of the town was upwards of 900 feet; so that, though there would be a fall from the Stubden reservoir of 130 feet, there would be a considerable rise from the existing service reservoir to convey the water into the town. One great hardship upon the inhabitants of the higher level was this, that they were bound to pay rates for the water to the corporation. The rates were compulsory, and the inhabitants complained very much that, though such was the case, they were left without a supply. But it could not be done with any amount of pressure; or, if it could, it would be attended with considerable danger. There were as many as 4600 houses, 20 mills, and the barracks, situated on that high level, and therefore the urgency of the case was apparent, and the committee would not wonder that there was a very loud demand for the water for which the inhabitants were rated. Petitions in favour of the bill had been presented to the House from the villages of Thornton and Clayton, which, though not in the borough, were situated on the line of the water-mains, and they were anxious to be supplied at a cheap rate. These were the only new works proposed in the scheme before the committee, though there were two other objects mentioned in the fifth clause, but they were merely alterations of the old works. They were these:—"The altering, raising, and strengthening of the embankment of the intended Stubden Beck reservoir, and the altering of the bye-channel Residium Lodge, waste-weir, and other subsidiary works connected therewith. The altering, raising, and strengthening of the intended reservoir to be constructed upon the Denholme and Carperley Becks, at their confluence near Doe Park." It was thought by the engineer to be safer to have an embankment of five feet above the top of the water level in the reservoir, and, by the present Act, they could only raise it three feet. He would only refer to one other matter, and that was, that by the Act of Parliament of 1854 the time within which the works then authorized to be completed was seven years, and they now sought an extension of that term by two years at the hands of the committee. A clause has also been inserted in the bill, by the consent of the engineers of the corporation and the mill-owners, defining a point in Sir William Cubitt's award which there had been some difficulty in understanding. In reference to the opponents of the bill, there were only two before the committee. The first was the corporation of Leeds, who alleged that under their Act they had the right to take water from the Wharfe, and they urged that the catchwater proposed by this bill would interfere with that right. But he believed it would be shown by the evidence that, so far from taking water from the Wharfe, the promoters would be actually increasing the quantity, because by the catchwater they would secure the water at flood tide and place it in their reservoir. By their Act of 1854 they had power to take the whole of that water in dry seasons, but now they would be able to secure to the mill-owners and inhabitants of Addenham a more constant and equable flow than heretofore. Those who were directly interested in the water—viz., the mill-owners upon the stream—did not object. Whether the Leeds corporation had another object in view would be seen presently; but, so far as the actual facts were concerned, they were wrong in saying that their right was interfered with. The petitioners further objected to the corporation taking powers, as they said, to sell water in bulk to the local boards of health in the surrounding towns, although they did not object to their supplying the individual ratepayers there. He could not conceive what possible objection there could be, provided the corporation had surplus water. There certainly was no difference in principle between selling in bulk to a local board or to the separate inhabitants of a township. The corporation of Leeds objected, further, that the promoters were seeking to carry their conduits and pipes to several towns beyond their former limits; but, inasmuch as the conduit and pipes would pass through or near to the places mentioned in the fourth section of the bill, the promoters asked for the power to supply them, but only if desired to do so. He submitted to the committee that every one of these places was in favour of the scheme, and the promoters sought no compulsory powers to supply or to rate them.

The CHAIRMAN: Are there any clauses in the bill fixing the price to be charged to the inhabitants of the various villages?

Mr. PICKERING said the price was fixed by the original Act of 1854, which Act was incorporated in this bill.

The CHAIRMAN: But that Act does not affect the places named in the fourth section of this bill?

Mr. PICKERING said it fixed the price to be paid by any persons taking water of the corporation. The only other petition against this bill was from two persons of the name of Ripley. These gentlemen were possessed of considerable property in the town of Bradford, and were the owners of extensive dye-works there. The ground of their objection was, that they considered themselves somewhat in the nature of rivals, as they had the means of supplying themselves with water and of dispensing it to others. In the years 1853 and 1854, so strongly did Messrs. Ripley feel the want of a supply of water to the higher levels in the town, that they themselves came before Parliament with a scheme to supply Bowling, but, as it met with great opposition, it was withdrawn. But, though the want was then admitted, they now came forward to object to the corporation meeting it. They also objected to the outlay, past and contemplated; but just let the committee observe the position in which, if the petitioners succeeded, they would place themselves. The works were not and could not be completed without additional powers; a rate must be made for the money already laid out, and, unless the works were finished, the petitioners, with others, must pay that rate without any possible return. And, inasmuch as by supplying the outlying districts the cost of the supply in the town would be to a considerable extent reduced, there really did not seem to be any grievance of which any ratepayer could complain. Another objection they raised was this—they said that, under the old Act, certain species of property had a right to a deduction, or could not be called upon to pay the full water-rate; that, with reference to garden land or land covered with water, they were entitled to a reduction of three-fourths of the rate. But this objection was not a valid one, and was based only upon the clumsy mode in which the rates on that class of property had been hitherto collected, but which would be remedied by the mode proposed in the bill. There did not seem to him (Mr. Pickering) any sufficient grounds for opposing the bill on this petition, and he hoped the committee, when they had heard the evidence, would declare the preamble proved. In order to test the feeling of the inhabitants, the Town Council had given an opportunity for presenting a memorial, but, with the exception of the Messrs. Ripley, there was not a dissentient voice.

Henry Brown, Esq., examined by Mr. JOHNSTONE.

I am the mayor of Bradford, and have lived in the borough nearly the whole of my life. I produce a table showing the rapid increase in the population since 1801. The town of Bradford is situated in a basin, and a large proportion of the population reside on the sides and at the upper portion of it. Among others, on the high level, there is the township of Great Horton, with a population of 28,142, and a considerable portion of Bowling is similarly situated. There are several brooks running through Bradford. One of them is called Bradford Beck, the water in which is very dirty—almost as black as ink—very offensive, and totally unfit for any domestic purpose. The principal part of the sewerage of the town discharges into it. There is also a canal in the town, which is equally bad, perhaps worse, because, in a great measure, the water which is supplied to it from the beck is stagnant. In fact, there is no supply to be gained from any of the brooks which is fit for use. In 1854 the corporation and the water company were before Parliament for powers to supply the town, and the result was that the corporation abandoned their scheme, and undertook the existing works of the company, and to erect also further works. The starting-point mentioned in the Act was the 21st of December, 1854; but, in consequence of difficulties, the transfer did not take place till the following October, which made nearly a year's delay in commencing the new works. Soon afterwards, the corporation entered into contracts for the execution of those works, and have incurred liabilities beyond the £450,000 which they were authorized by their Act to raise. I produce a table showing the cost of the old works, the payments and liabilities on account of the construction of new works, the estimated further cost for completion of works authorized by existing Acts, and the estimated cost of proposed additional works. The totals show that the payments to April, 1858, were £360,731; the liabilities at that time were £108,792; the estimated further cost for completion of authorized works is £109,000, and the cost of proposed additional works £26,750 making a grand total of £605,274. It is clear, therefore, that our present borrowing powers are insufficient, and the primary object of this application is to extend them. We thought also that, as we were coming to Parliament, if we could improve our works we should do so, especially after taking into consideration the complaints of the inhabitants of the upper districts, who cannot get a proper supply of water, although they are obliged to contribute towards the expense of the works. I am acquainted with the proposed scheme for new works, and I am of opinion that the conduit from the Stubden reservoir is a just and necessary work; that it will be of great importance and advantage to the borough, and will remove the causes of complaint by the inhabitants in the high-level districts. It will also enable us to supply water not only to Bradford but to any contiguous place on the other side of the hill—amongst others, Thornton and Clayton, which are very populous places. There are no compulsory powers, however, given to the corporation in reference to places outside of the borough. Having examined this scheme, I am of opinion that, though the Hewenden reservoir has been commenced and the works to a certain extent carried on, it would be good policy to adopt the works here recommended. I am aware of the provisions of the Improvement Act which constitute the corporation the Board of Health for the borough, and that by that Act we are prohibited from coming to Parliament till special meetings have been convened by notice, and a special order and resolution adopted by the ratepayers. That course has been taken in reference to the present application, and the plans have been deposited in the town-clerk's office for inspection. At these meetings, the resolutions authorizing this application were adopted, in the first instance, unanimously, and in the second with one dissentient.

By the CHAIRMAN: Of the 132,000 inhabitants, about 23,000 do not now get a supply of water, although all are rated. If we obtain this bill we shall be able to supply the whole. We have three rates. There is, first, a water-rate, payable by those who receive water, which is regulated according to the rental; then a rate of 3d. in the pound, which extends over the whole town; and, in addition to this, we have what is called a borough rate, to make up any deficiency which the 3d. does not cover. Those inhabitants who are not supplied by us get their water from the streams which run down the hills, or from artesian wells. Some parts of the town are still supplied by carts. [Witness handed in a table showing the receipts of the old company for the supply of water from the Manywells stream, which supplied only the lower parts of the town.] Of late years the reservoirs have not been found to be

sufficient; and even within the last few days the supply was so low that, had a large fire occurred in the neighbourhood, the whole would have gone. The company were not able to supply the demand, and often had to refrain altogether from supplying mills and other works. The amount received by the company from consumers in 1847 was £4253; the amount received for water-rates in the year ending December, 1857, was £10,360. The amount received from the 3d. rate for the same period was £2682, and the amount of the borough rate of 6d. in the pound, made this year, produced £7382. That is exclusive of the interest upon the money borrowed. On account of the inadequacy of the supply, we have been obliged to give up the supply for trading purposes, except in the case of very small concerns, and have been obliged to restrict ourselves to the domestic service of the district. It is rather difficult to make any estimate of the increased income to be derived from an increased supply. We believe that for manufacturing purposes there will be a very large demand. It is estimated that the supply will be equal to 10,000,000 gallons per day; and, taking the consumption at 20 gallons per head for domestic and sanitary purposes, the requirement will be 2,750,000 gallons, leaving for sale in bulk for manufacturing and other purposes 7,250,000 gallons, which we propose to sell at 3d. per 1000. I may state that the Windhill Local Board of Health have contracted with the Local Board at Shipley to supply them for a term of years at 6d. per 1000 gallons.

By Mr. JOHNSTONE: I am aware that before the scheme of 1854 received the sanction of the Legislature evidence was given that it would be a self-supporting system. I believe it will be when the works now proposed are carried out, though I have no doubt the inhabitants of the borough will be rather heavily taxed for some time to come in consequence of the length of time which the works will take in construction.

By the COMMITTEE: The rateable value of the property in the borough is £272,000.

Cross-examined by Mr. VENABLES: The increase in the population has not been going on so rapidly of late. We have at present a rather slack trade. In addition to being able to supply the higher portions of the town, we consider it very desirable to be able to supply water in bulk, with a view to relieve any financial pressure upon the borough funds. It is very important for the additional districts themselves that we should be able to supply them, whatever it may be to ourselves. It is not intended to have a compulsory rate upon them. The out-townships did petition against the bill, and to relieve the minds of the inhabitants from the fear of imaginary wrong, we inserted a clause not to rate them for the works to be constructed under the Act of 1854. We have sufficient water to supply them, and we are not now seeking powers to increase the quantity at command. The drainage of the town goes into the river Aire, so that, below Bradford, it is not fit for domestic purposes. The town of Leeds does not get a supply from the Aire, but the Wharfe.

By Mr. LITTLER: I was one of the original shareholders and a director of the old water company. When we came before Parliament in 1853, our bill was rejected because the committee thought that our contemplated supply was not sufficient for the wants of the district. We provided for 4,000,000 gallons daily, which, though enough for every domestic purpose, was not sufficient for manufacturing and trade purposes. I cannot tell what proportion of the present revenue is derived from the supply to mills. No doubt some of the mills will not come to us at all for a supply; but this will greatly depend upon the price at which they can get it elsewhere. At present they are obliged to pump from an artesian well, but I am not able to tell at what cost. I do not know that the whole expense is less than a halfpenny per 1000 gallons. I have not a doubt that ultimately the scheme now before the House will be worked to a profit; but whether or not it will be with the present population, depends very much upon the number of manufacturing customers we get, and the extent of supply beyond the borough. I do not think that the result of the competition between the Water-Works Company and the corporation was to make this scheme too large. The 3d. rate is a rate for public purposes, and for paying the interest. If the 3d. rate is not sufficient, we levy a borough rate. Messrs. Ripley pay these rates, although they supply themselves with water. The water they have is very hard, and not suitable for domestic purposes.

Mr. VENABLES asked the chairman to move the House to lay before the committee the evidence taken on the bill in 1853.

WEDNESDAY, APRIL 14.

The committee re-assembled at twelve o'clock, when the following evidence was taken:—

Mr. *Jonas Jennings*, examined by Mr. PICKERING.

I have been relieving officer nearly eighteen years for the township of Bowling and Horton. The population is upwards of 50,000. This district is on the high level. The supply of water is very defective, especially in the higher parts; and it is procured from wells and conveyed in water-carts. Some of the wells are badly situated, one being near the burial-ground. A vast number of people resort to that particular well. I have seen hundreds of people going to that well; they stand in a row, and take their turns in filling their cans. I should say that from two to three thousand have recourse to that well alone. These townships pay the water-rate, and the feeling is universal that it is unfair to pay a water-rate without receiving any benefit. The number of persons who would be willing to take water from the company in this district was very large—quite 13,000. A better supply would exercise a sanitary advantage upon the district. I know the Cannon mill, which for want of water has frequently been compelled to stop work. There is another mill, called the Cliffe mill, which is only supplied by collecting the water as it runs down the road. I also know Cousin's mill. I have seen the water in the mill dam so hot, in consequence of being used over and over again for condensation, that the gold-fish kept in it have been scalded. As far as my judgment goes, a better supply of water would be exceedingly beneficial for mill-works as well as for domestic purposes. On the high level there are six mills, and I believe there is only one that is fairly supplied.

By the COMMITTEE: There are about 8000 houses in my district; the average rental is about £3. 10s. From three to four persons inhabit a house in prosperous times. Upon reflection, I think I may be wrong in saying there are 8000 houses, as the population is, as I have said, 13,000.

Mr. *William Booth*, examined by Mr. JOHNSTONE.

I live at Eccleshill, a village beyond the boundary of Bradford. It is a place which might be supplied with water if the present bill were passed. I am the surveyor and inspector of nuisances for that district under the Local Board of Health. The population is about 5000. The principal reason why the village applied to have a local board of health was, in order to obtain a better supply of water. The board has been in existence three years, but up to the present time no better supply has been obtained. The inhabitants have petitioned the corporation of Bradford to undertake the supply, and they would be willing to take it if it could be had. The water at present in use is very hard. At first it was supposed there were compulsory clauses in the Act, and objections existed in consequence, but since it has been ascertained that no such compulsory power exists, the inhabitants are anxious to see the project carried out. I believe the township would prefer to have water supplied in bulk rather than to individual consumers specifically. A recent meeting of the Local Board of Health had been held in favour of the scheme, and, in my opinion, it will be impossible to obtain a supply from any other source. There are four mills in Eccleshill, and I believe there would be more built if there was a more abundant supply of water. The Local Board of Health cannot procure the supply themselves. In the mills the wool is scoured to a large extent, and for this purpose a large supply of water is necessary. At present the water is brought back after having been used in other townships.

Cross-examined by Mr. VENABLES: I do not know at what rate water could be supplied at Eccleshill from Bradford. I calculate we should have to pay 6d. per 1000 gallons. We should prefer having the supply in bulk. The Local Board of Health would regulate its distribution, and levy a rate on the inhabitants. The inhabitants have not contributed to the cost of getting the bill, nor do they wish to make it compulsory on the Bradford corporation to maintain a supply. If the corporation obtain powers, the inhabitants wish to have the privilege of availing themselves of the opportunity of getting a supply without being under compulsion.

By the COMMITTEE: I have made no estimate of the cost of the supply of water. The inhabitants generally are now in favour of the bill, since the promoters consented to insert an optional in place of a compulsory clause.

Mr. LITTLE, who appeared in behalf of the Messrs. Ripley, said he was not there with the view to throw out the bill, but only to protect the interests of his clients, who were proprietors of a considerable amount of water in the town. After the examination of the mayor, and the subsequent information of what the estimate would be, as laid before the committee, his clients were perfectly satisfied that it was necessary for the town to carry out the bill, and, therefore, they withdrew their opposition.

The CHAIRMAN asked if the promoters were prepared to place a limit on the cost of supply to these districts?

Mr. PICKERING understood that was to be a matter of agreement afterwards.

The CHAIRMAN thought it would be hardly fair to the ratepayers of Bradford to supply the water to the outlying districts at a lower rate than they were paying themselves.

Mr. PICKERING put in a report to show that the rateable value of Eccleshill was estimated at £6060 in 1851. The witness stated, in reply to questions, that the rateable value had increased more than one-fifth since, and that the property was on the average rated at two-thirds of the rack-rent.

Mr. PICKERING called the attention of the committee to a clause in the General Act giving the local board authority to require that houses should be supplied with water, if it could be done at a cost not exceeding 2d. per week, and in case of default to lay down pipes and levy a water-rate.

Mr. *Julius Dalby*, examined by Mr. JOHNSTONE.

I am a member of the Local Board of Health of Eccleshill, and one of the deputation appointed to represent them before this committee. The water now in use is very hard. The village lies on a high level, and there is no chance of its being supplied on any independent system. The township of Windhill, near Shipley, is supplied in bulk by the Shipley Water-Works. The Windhill Board of Health pay 6d per 1000 gallons to the Shipley Water-Works. The matter has been considered several times by the Eccleshill Board of Health, and we were unanimously in favour of obtaining a supply under a similar arrangement from the corporation of Bradford. It is a fact that, as the population has increased, the supply of water has decreased, owing to the extension of mining operations interfering with the wells. Only about 200 houses, out of more than 800 in the township, have a supply of their own from wells. In dry seasons the inhabitants have to go a long way for water. Forty years since I have gone a mile and a mile and a quarter for water, and the supply now is not so good as it was then.

The report of Mr. Ranger, the Government inspector, employed by the General Board of Health to examine and report upon the condition of the water supply, was here put in.

Cross-examined by Mr. VENABLES: The population of Eccleshill is about 5000, of whom about one-fifth may be called a scattered population. We have applied to the old water-works for a supply, and the reply was that it could not be granted with the powers then possessed. I believe the old company came to Parliament for extended powers, but we did not apply to have Eccleshill included in the bill. Should the bill pass, I suppose we shall be supplied the same as other people are; I understand the corporation will take powers to lay down a conduit for the purpose. We have made no calculation, exactly, as to the quantity of water we shall require; we thought it would be time to do that after the Act was obtained. Nor can I say that we have come to any exact estimate as to the cost of laying down the necessary system of pipes. There would be 600 houses glad to have it, and two of the mills.

By the COMMITTEE: We have made no arrangements rendering it compulsory on the corporation of Bradford to supply Eccleshill. We have not gone into details as to the cost of supply, nor as to the revenue that would be obtained from the consumers.

Re-examined by Mr. PICKERING: All I can speak to is, that there is a want of water, and that we shall be glad to have it, whether supplied by the corporation of Bradford or by the Local Board of Health.

Mr. *Joseph Craven*, examined by Mr. PICKERING.

I am a partner in the firm of Craven and Co., Thornton. The population is about 8,000, and the rateable value of property there is £8200. Our property is rated at £400 or £500. Thornton is about four miles from Bradford. The proposed conduit would pass through the centre of Thornton. There have been several public meetings on the subject of water supply, and the feeling is unanimous in favour of the present scheme. We have not sought for compulsory powers, but are willing to take the water on the terms paid in Bradford itself, by a per centage on the value of the property. At present the supply is obtained from wells at a distance, varying from 300 yards to a mile and a half. In summer, water has to be fetched a mile and a half. The mills are very badly supplied; I have known the water to be fetched in barrels for the mills. At our mill we have to pump it a distance of 50 yards, at a heavy expense, and the water is very bad.

By the COMMITTEE: The cost of supplying our mill amounts to between £70 and £80 a year.

Cross-examined by Mr. VENABLES: The people of Thornton have not agreed to contribute to the cost of the work. The conduit will pass through Thornton, and the corporation of Bradford would have to incur the same cost whether they supplied us or not. In the General Act there is a stipulation that corporations shall not be compelled to lay down pipes unless the revenue amounts to a certain sum. Out of the whole population of Thornton, about 6000 would be benefited by the bill. The population,

generally, is not scattered; they reside principally in the line of the conduit. I do not know what would be the cost to the corporation of Bradford to lay down the pipes for supplying the inhabitants of Thornton.

Re-examined by Mr. PICKERING: The village of Clayton is also in want of water, where the supply has been diminished in consequence of the extension of mines.

J. W. Leather, Esq., examined by Mr. PICKERING.

Witness is the engineer to the corporation, and explained the nature of the original scheme for supplying Bradford with water in 1842, and also of the subsequent scheme projected in 1853, for increasing that supply by means of the waters collected in the valley of the Wharfe and the valley of the Aire. By these works, when completed, about 10,000,000 gallons can be supplied per diem. It is not proposed, he said, to increase this source of supply, but to provide for the wants of the high-level districts in the town. The Chellow reservoir is 640 feet above the level of the sea; the existing service reservoir is 521 feet; while the highest level of the town is 925 feet; so that it is impossible to supply that portion of the town from the existing reservoirs. It would be dangerous to attempt to send the water by pressure, as the pressure necessary would be equal to 300 lbs. on the square inch. That being impracticable, the plan I propose of taking a conduit through Thornton and Clayton round to that part of the town, would accomplish the object, besides being less expensive, and would at the same time subserve the purpose of supplying on the route Thornton and Clayton, both populous places and in want of water. I believe buildings are extending very considerably in the higher parts of the town. There are a number of mills there. Then we pass through portions of the townships of Pudsey and Eccleshill with our pipes, and we include them in our bill.

Mr. PICKERING: Would you explain to the committee the proposed alteration of the conduit which goes to Burnsall?

Mr. *Leather:* Burnsall is a small village of about 250 inhabitants. The Burnsall people get their supply at present from the water-stock at the back, which flows down through the village. As our conduit intercepts that water above the village, they were in a great alarm, and requested us to give them a conduit with three taps in the village, from which they might draw water. We have consented to do that, because it is a matter which they have a right to expect. We pay less for the cost of the conduit than we should have to pay in compensation.

The CHAIRMAN: Is there a clause in the bill to provide for that?

Mr. *Leather:* Yes, sir. The cost of that part of the work I estimate at £530. The feeling in Burnsall is very much in favour of the scheme.

Mr. PICKERING: Now explain the next part of the scheme.

Mr. *Leather:* The next part of the scheme is a conduit and catchwater to intercept a portion of the ground at Addingham, and we propose, as we cross the streams which now form the chief supply of that village, to put out from our already-authorized conduit into those streams a quantity of water, considerably more than flows down them in the dry season. Our powers enable us to leave those streams dry at that season, but we propose to supply a certain and regular flow of water. We expect to meet the cost of that particular work by the saving in compensation which will accrue in consequence of this arrangement. The cost of that conduit from Heathness Gill to Marchup Beck I estimate at £5420, including the catchwater. We propose to give out into one stream 83,000 gallons a day, and into the other 105,000 gallons.

Mr. PICKERING: What is the cost of the other conduit?

Mr. *Leather:* The cost of the extension conduit to Eccleshill from Thornton Moor is £14,267, to which I add for distribution £2733; making a total of £17,000.

The CHAIRMAN: Do you allow only £2733 for the cost of distribution in the townships of Thornton, Clayton, Wilsden, and also the portions of Pudsy, Farsley, and Eccleshill?

Mr. *Leather:* No more. That sum will not be expended immediately, and only expended under the provisions of the General Water Act, by which the inhabitants will have to pay 10 per cent. upon the outlay. The sum stated will allow for eight miles of small pipes, which, I think, is more than we shall be called upon to make for many years to come.

Mr. PICKERING: Now I will come to the alteration of the reservoirs. You propose the embankment of the two reservoirs: take the reservoir at Thornton first.

Mr. *Leather:* One reservoir is our own store reservoir, and we propose to raise the bank to 14 feet. Under our present powers we could raise the bank three feet, and we are only asking for power to raise it an additional foot. In my opinion, the bank ought to be five feet above high-water level for safety, and that is the reason why we seek this power.

Mr. PICKERING: Now go to the other reservoir.

Mr. *Leather:* The other reservoir is the Doe Park reservoir. That reservoir we are compelled to make with a capacity of 110,000,000 gallons, and we cannot get that quantity without raising the bank, as we had to diminish the area in compliance with the apprehensions of the proprietors of some coal workings. We propose to raise the bank eight feet, and the top water four feet. The estimated cost of raising the two reservoir banks is £3800. The total cost of all these works will consequently be £26,750. In addition to this, there is the distribution in the borough, the cost of which will be £24,000.

The CHAIRMAN: Does that include several of the places within the borough?

Mr. *Leather:* All the places—Bradford, Bowling, Horton, and Manningham.

The CHAIRMAN: I may as well state that the committee wish for an account of the past expenditure. When the parties came before Parliament the last time they must have put in estimates. Let us see whether any difference has arisen between the estimate and the expenditure.

Mr. *Leather* handed in an elaborate tabular statement showing the various items of outlay and liability. His original net estimate for constructing the works was £210,600 on the Wharfe and Aire portions, and £29,400 on the Hewenden portions; and he proposed to add 10 per cent. to that total of £240,000, to enable the corporation to carry through those works. To this additional £24,000 there was to be added £24,000 for the distribution of water in the borough, and £26,750 for the new works just described; making a total of £74,750.

The CHAIRMAN: Then your works will cost £74,750 more than what was estimated?

Mr. PICKERING: It was always contemplated that there would be the cost of distribution plus the £240,000.

The CHAIRMAN: No evidence of that was given in 1854. When do you expect the whole of the works to be completed?

Mr. *Leather:* In about two years from this time, including the extensions. Under the bill of 1854 we had seven years from that date to complete the work; and the present bill, I think, asks for two years in addition.

Cross-examined by Mr. VENABLES: In 1853 I was engineer to the old company, and then proposed a plan by which a supply of 4,000,000 gallons could have been obtained; but the plan actually introduced into Parliament proposed to supply 10,000,000 gallons, in order to compete with the corporation. In my plan for 4,000,000, I proposed to get the supply from a tributary of the Aire called the Worth, in a valley to the west of Hewenden. I dare say 4,000,000 gallons would be sufficient for the wants of the districts at present proposed to be supplied. I believe the population of Leeds is about 200,000, and the supply there is about 4,000,000 gallons. The additional townships we propose to include in the bill contained a population of about 43,000 at the late census. None of these districts will contribute towards the cost of the proposed works; but no special outlay will be incurred in those districts, unless the return pays 10 per cent. on the outlay. I do not remember whether, in the bill of 1854, we applied for power to sell the surplus water. The water we discharge into the river from our compensation area at the top of the map is soft, but tinged with peat, but not so soft as the water in the lower area. The water in the larger of the appropriated areas is particularly soft and good, but the water of the 1860 acres is somewhat harder. When the works are completed, we shall take the whole quantity of 10,000,000 gallons to which we are entitled; and, if we cannot get a demand for the surplus water at one price, we shall take a lower price. I can give no estimate of the probable consumption. Should 5,000,000 gallons be the extent of the demand, the remaining 5,000,000 gallons will be run off into the stream which passes through the town, and thus improve the sanitary condition of the town by purifying that which is at present in a most dreadful state. No doubt one great object of the bill is to raise money, but I consider the works we propose to be important for securing a larger supply of water.

Re-examined by Mr. JOHNSTONE: I do not think 4,000,000 gallons a sufficient supply for Leeds; it is ineligible both as to quality and quantity, and by-and-bye I believe they will have to enlarge their sources of supply.

Mr. *Charles Gott*, examined by Mr. HOPE SCOTT.

I am borough surveyor, and also manager of the water-works under the corporation. It is upon my calculation that the estimate of the present population has been formed. Taking the new houses which have been erected since the census, and calculating 5·6 persons to each house, the increase would be 29,192. The estimate for the new works is £26,750. The remainder of the additional capital is to complete works already in progress, to which the corporation are bound by Act of Parliament. The water-rate, at 3d. on the rental, produces £3000; the water-rents, derived from the old company's works, produce £10,360; and the borough rate in aid produces £7000. The power of levying the borough rate is unlimited. The old works supply about 5½ gallons per head, calculated upon a population of 90,000. The number of houses actually supplied is 16,700, including trade purposes and mills. The expected increase of water-rent in the lowest areas I calculate will be £2574 for domestic purposes. The additional district, which the works of 1854 would supply, I estimate at 19,000; and, taking the same proportion of consumers, it gives an additional revenue of £2730. In the third district—the portion beyond the present limits of supply—the population is 23,000; and from that district I estimate the rent will amount to £3300. My calculation is based upon the population, and not upon the rental.

The CHAIRMAN: We must have the rental as well as the population.

Examination continued: The houses in the second district are much the same as in the first; but in the third the houses will be of less value. No doubt, on some portions of the property, villas will spring up. My calculation gives a total expected increase of rental within the next two years, upon the old and new works, of £18,964. It is impossible to say what quantity of water will be consumed by the mills. According to the mayor's estimate, two-thirds of the surplus water beyond domestic use would be sold, which, at 3d. per 1000 gallons, would realize an additional £22,000. This would give a gross total of £44,016; from which there would have to be deducted £2000 for working expenses. This would necessarily relieve the borough rate in aid, which is now 6d. in the pound. Including interest on money borrowed and other charges, the amount to be paid in the first year will be £45,500; and the difference between that and the estimated increased rental of £42,016, will be covered by a 3d. rate.

Cross-examined by Mr. VENABLES: I have formed no estimate of the amount to be derived from the outlying districts. I think it would be more profitable to sell the water in bulk to those districts, than to supply it to the inhabitants individually.

Re-examined by Mr. HOPE SCOTT: When I say it would be more profitable to supply in the bulk, I allude to the diminution of working expenses.

Mr. *Thomas Ambler*, examined by Mr. JOHNSTONE.

I am an alderman at Bradford, and a wool-comber and manufacturer, and have two establishments in the borough. I use steam power. At the Manningham establishment I require a great deal of water, for washing wool and other purposes. I wash from 500 to 600 packs of wool per week, and require about 250 gallons for each pack. I also require water of good quality. My present supply is obtained by pumping from springs. That supply has sometimes failed, as in 1853, when I had to cart water from Bradford at a cost of £100; and we were obliged to use the same water over and over again for condensing purposes, until it boiled. Altogether, I require 250,000 gallons of water per week for both my places—over 12,000,000 a year. I would be willing to pay from 3d. to 4d. per 1000 gallons, in preference to getting my supply in the present manner. I should then get a continuous supply and water of better quality, and should save the expense of pumping. There are many manufactories similarly situated.

Cross-examined by Mr. VENABLES: If the present works should be carried out, I believe there would be a very large demand for manufacturing purposes. I am aware that the corporation seek for power to sell water outside the municipal boundaries.

Re-examined by Mr. HOPE SCOTT: We shall have under this scheme a large quantity of surplus water until the population has sufficiently increased to consume the whole; and in the meantime the corporation propose to sell the surplus water to the outlying districts. Manchester, I believe, supplies Salford on the same principle. There are about 100 mills in Bradford, and it may be supposed that each of those mills would average one-third of my consumption, which would come to 400,000,000 gallons per annum consumed for manufacturing purposes.

Mr. *Joseph Rawson*, examined by Mr. HOPE SCOTT.

I am a mill-owner on the high part of the town. At present my supply is obtained by catching water from the road. I agree with the last witness that there would be a large demand on the part of mill-owners, and that the water would be both better and cheaper than it can be obtained from pumping. I would rather buy it myself than pump it. We have no domestic supply in my locality. I have not been able to get a drop for home consumption from my pump for the last month.

Cross-examined by Mr. VENABLES: The corporation could not supply

the high level without new works. As far as we are concerned, we shall be satisfied if we get a supply to that locality, and allow people in other districts to look after themselves.

Re-examined by Mr. HOPE SCOTT: I should certainly like to see the rates reduced.

This concluded the case for the promoters.

The committee then adjourned.

THURSDAY, APRIL 15.

Mr. *Leather* was recalled by Mr. JOHNSTONE, and said that by the proposed works the quality of the water would be improved by being amalgamated with streams that were more free from peat. Chemists said that on the introduction into a body of water of a flow of a different character an action took place which neutralized the objectionable properties of the former to a certain extent. He thought that the facility for bringing about this would be, of itself, a reason for constructing the works at Addingham.

By Mr. VENABLES (for the corporation of Leeds): The Bradford corporation did not consider themselves restricted by the former plans; they had a clause to make further works by obtaining permission from the owners of land. The new works would cause a discharge of a better quality of water. The quality down at Leeds would not be much improved, at least to any appreciable extent.

Mr. *H. Brown*, the mayor of Bradford, was also recalled, and, in answer to the CHAIRMAN, said he was not aware that the ratepayers of that town had been made cognizant of the proviso proposed to be introduced into the bill, that the outlying districts would be free from the compulsory rating. Their opinion had never been taken on the subject.

Mr. VENABLES said the observations which he would make to the committee on the part of the corporation of Leeds would be brought into a very small compass, for the reason that, although the committee had paid a very careful attention to the financial part of the question, that was not an element in which his clients were particularly interested.

Mr. HOPE SCOTT said he understood the bill, as originally proposed, contained no compulsory rate as affecting the districts to which the chairman had alluded in his question to the mayor of Bradford,—the rating was to be within the borough only, as provided by the bills of 1854 and 1855.

The CHAIRMAN inquired what, then, was the necessity for introducing this proviso?

Mr. HOPE SCOTT said the chairman was aware that it was very common to introduce provisos which were really not at all necessary for saving the rights of parties. The promoters were anxious to remove even groundless fears; everybody's rights were saved. (A laugh.) A number of villages were within the area of supply, but were without the range of compulsory rating; and the bill, as introduced, did not extend the power of rating fixed by the Act of 1855, but retained the power of supplying water to these places. The learned counsel then read the proviso commencing, "In order to remove the doubts," &c. He repeated that in this bill there was no power of rating outside the borough, but these villages being afraid that they would be rated, the proviso was introduced to satisfy them. The first company had no compulsory rating in these places; the corporation succeeded only to the rating powers which the company exercised, and did not now seek to extend them. In this bill additional places had been put in for supply, but there was no further power of rating.

Mr. VENABLES then opened the case for the petitioners. He said the corporation of Leeds had nothing to do with the financial part of the question, as it was quite immaterial to them what Bradford paid for carrying out the water scheme. Leeds was only interested in an indirect way; it was interested that Bradford should not expend its money for the sake of monopolizing a very large supply of water which it could not possibly want. He objected to the promoters of the bill carrying on further works than they were authorized to do by their former Act, and to their finding a new market for the water which they would obtain from the Wharfe, and establishing a sort of trade or good will in it with other parties. The manner in which this claim might be entertained by the committee would probably have a great weight in future discussions before Parliament, for reasons which he would state. The corporation of Leeds had paid largely for the right to obtain water from the river Wharfe; and their interests would be materially affected in consequence of the promoters of the bill having introduced powers which varied in some important points from the provisions of the existing Act. It was proposed to give powers for making a long line of conduit, and to extend the district indefinitely, and, last of all, for giving the promoters a roving privilege to go wherever they could find customers, to whom they would give a vested right in the water on which the people of Leeds depended for their daily supply. It had been said that it was important to supply an abundance of water to Bradford as it contained a population of 130,000 inhabitants; that is, the promoters said, "We will have 12,000,000 gallons daily, or about four times the supply which the best engineers have been in the habit of recommending manufacturing towns to secure, not only for domestic purposes but for the use of their mills." The town of Leeds, according to the last census, contained a population of 188,000, and he might safely say that it was now 200,000, not taking in many thousands who were in the water district, although not in the borough; and these inhabitants had only a daily supply of 4,000,000 gallons, partly obtained from local sources, but in the main, or to the extent of 2,500,000, from the river Wharfe; and they naturally looked with jealousy on the claims of any persons to diminish the volume of water in the river at present, or in any way to throw impediments to their getting a greater supply, which they would undoubtedly want at a future day, as the demand of a growing population increased. The present water system in Leeds was settled in 1852 in a manner somewhat similar to that of Bradford, by a company transferring its powers to the corporation. The corporation thus obtained the works on the Wharfe, at a short distance from Leeds. [The learned counsel pointed out on the ordnance-map the place Arthington, where the water was taken from the Wharfe for the supply of Leeds, and also the additional district proposed to be taken by the promoters of the Bradford Bill.] Leeds depended upon the Wharfe for a supply of water. It was true that, for aught he knew, it might be possible to get some water from some parts of the river Aire; but at all events the lower valley of the Aire, between Leeds and Bradford, was wholly useless for such a purpose. But Bradford was differently posited, and its situation with respect to the Aire enabled it to obtain a supply from that river; indeed, it was a remarkable fact that a scheme had been prepared by Mr. Leather himself for obtaining a supply from a tributary of the Aire. Instead of deciding, however, to procure water from that source, the promoters of the bill had appropriated a large portion of the Wharfe, and the amount of water available for Leeds was very much diminished. At present the corporation of Leeds were only entitled to get 2,500,000 from the Wharfe, but Mr. Hawksley, their engineer, seeing that a large and increasing population would in course of time require an additional supply, arranged the works so that if it were found necessary they could supply no less than 8,000,000 gallons daily, which, as far as quantity was concerned, would perfectly satisfy the wants of the town for a long time to come. The committee were aware that there was this difficulty to meet: every gallon of water carried with it a value that must be paid for. That element was of so much importance in manufacturing districts that the mill-owners generally resisted in the strongest manner any attempt to reduce their supply of it. That feeling existed in the neighbourhood of Leeds to such an extent that the corporation had been obliged to make very costly agreements with the mill-owners, having paid to them £17,000 as compensation for the supposed damage done to them by the public water-works. Separate arrangements had been made with the mill-owners, according to circumstance. With some of them it was arranged that if the Leeds corporation, in order to supply the town with water, drained the river dry, they would have no right to complain, as they had been compensated for the worst that could happen; but with other owners the case was different, and whenever the corporation required water over and above the 2,500,000, they would have to pay for every additional million of it. This was the consideration which entitled the corporation of Leeds to complain of the proposed bill, the more the waters of the Wharfe were diminished by the new works, the larger would be the rate of compensation demanded by the mill-owners. In the Leeds Water-Works Bill it was provided that the corporation should be at liberty to apply to Parliament for a further supply of water. In every agreement it had been thought necessary to stipulate that they should not be prevented from applying to Parliament for water, and had consequently given a sort of public notice of this intention. There were certain districts in the neighbourhood of Leeds that were not supplied with water, and, in consequence of the dissatisfaction expressed thereat, in the course of last year the corporation gave instructions to their surveyor to report on the necessary alterations. The business had so far proceeded that the surveyor had completed these instructions, had reported that the cost would be about £25,000, the committee of the corporation entrusted with these matters had approved of that report, and there was no doubt that either that scheme or some other would be submitted. Therefore the Leeds corporation were in this position, that they were reduced by an almost positive necessity to give notice that they wanted a further supply of water. Being in this condition, and having already been injuriously affected by the appropriation of the Wharfe waters to the purposes of the borough of Bradford, they naturally watched with great care any intention to appropriate more of them. When they first heard of the present scheme, with the usual formal notice sent to all other persons interested, giving the short title of the bill—that the object was to supply more effectually with water the borough of Bradford, to continue certain powers, and generally stating the objects of the bill—it was intimated in addition, that, "to prevent any misrepresentation, it was not intended by the said Act to seek powers to divert any streams or springs whatever other than what they possessed by their existing Act;" and that the proposed scheme, while aiding the promoters "to improve their property, would enable them to compensate more effectually the owners of streams and springs used for the purposes of that Act." Under that notice the learned counsel contended that the promoters were estopped from taking any additional water, and it was not a sufficient answer to this objection to say that they would only take a small quantity. It had been stated several times by the promoters since the issuing of that notice that no additional water would be taken, and he trusted the committee would not permit them to wander from that promise. Mr. Leather had said that by the scheme proposed there would be an improvement of the quality of the Wharfe water, owing to the new water that would be turned into the river; but the real object of the bill was not to turn water into the Wharfe, but to divert water from the Wharfe to Bradford. By the new scheme, either by altering the levels or otherwise, Mr. Leather, the engineer, would be able to take those very streams which, in the notice alluded to, it was pretended there was no intention of taking. Mr. Leather said he had power to take these before, without the necessity of seeking parliamentary assistance; but Mr. Hawksley, the engineer to the Leeds corporation, denied that any such power existed before. The clause in the former Act, which Mr. Hope Scott had read, did not confer any such powers. It said, "Notwithstanding anything in this Act contained, the company may, from time to time, but only by agreement with the owners of streams and springs which the company may require for the purposes of this Act," &c. The committee would not fail to observe that any interference with any additional streams and springs, even with the consent of the owners, was only to be for "the purposes of the Act," and he contended that the scheme of Mr. Leather did not properly come under such a designation. The promoters had not power under that clause to take any step which would injuriously affect the interests of parties who might have objected to it had they known of it, and had their attention called to it in time. It was said that this proposed new conduit would do no harm, and that it was wanted for the purposes of the Act. It might be as well said that a railway company, having obtained general powers under an Act of Parliament, might construct a conduit——

Mr. HOPE SCOTT: Or erect a siding.

Mr. VENABLES: No, the cases were different; for the siding would be for the purposes of the Act, but the conduit was not. The corporation of Leeds objected to any further interference with the Wharfe, and contended that the promoters could not possibly want the amount they sought; but if they had any powers to take more under their existing Act, let them take it, and not come before Parliament with such a scheme as the present, to get more water than they wanted, and consequently add to the amount of compensation which his clients would have to pay when they should have inevitably to extend their consumption of water from the Wharfe. The next point to which the corporation of Leeds objected was the unnecessary extension of their district by the promoters of the bill. He did not mean for a moment to say that, if any neighbouring village to Bradford wanted water and could not otherwise be supplied, the corporation of Leeds would vexatiously object to its obtaining a supply from Bradford; but he could not help remarking that, from all that appeared, the inhabitants of neighbouring villages to Bradford did not show any very great eagerness to avail themselves of the boon which the promoters of the bill were prepared to give them, even although in getting it they would not be liable to the compulsory rate. Respectable witnesses were called from Eccleston and Thornton, who merely said that it might be convenient to obtain water from Bradford by the new conduit, but not one word of evidence had been given about the necessity of introducing these various villages into the scheme,—they did not seek for admission, and they had been left out of the former plans of the promoters. But, irrespective of this, the corporation of Leeds objected to a proposal which would enable the promoters unnecessarily to give other large districts which did not seek for it a vested interest in the Wharfe. Let it be remembered that when the corporation of Bradford formerly came before Parliament their demand was the extravagant one of 12,000,000 gallons per day, the same as that of the company, and the evidence was entirely in favour of the corporation, without mentioning those other districts which were proposed now to be embraced by the bill; consequently, as far as these districts were concerned, his clients

only asked the committee not to give any vested interest in the Wharfe to parties that did not want it, and which parties were formerly left out by the corporation of Bradford. His clients objected to these large districts being put into the position of rivals with Leeds, which had Bradford already as a rival, and could not help it, but did not want, unnecessarily, to multiply competitors with it. He contended that the Wharfe properly belonged to Leeds, and the promoters ought to go somewhere else if they wanted more water. But, further, if the corporation of Leeds objected to the introduction of new districts which did not even apply for it, they still further objected to the power of supplying water in bulk to any person whatever. It was said by one gentleman that the promoters did not intend to exercise this power, except with reference to Thornton and a few other places. The learned counsel read the 3rd clause conferring this power, and said he believed it to be a wholly unprecedented clause. His learned friend, Mr. Hope Scott, with the excellent memory that he possessed, asked a witness whether Manchester had not the power of supplying Salford in bulk? Now, he (Mr. Venables) was perfectly aware that Manchester did supply water, having a supply power, but under peculiar circumstances which did not bear upon the present case. If the power sought by the promoters of this bill were conceded, he could easily conceive that this corporation, having 5,000,000 gallons of water which they did not know what to do with, would make it the interest of a town at a considerable distance, instead of getting water from a neighbouring source, to come to them and get a conduit constructed for the purpose of furnishing them with a supply. It might be a very cheap plan, and thus some other town, a long way off, quite out of the area, would have a right, as against Leeds, to take all this water. Because, supposing a bill for such a purpose was promoted—supposing the landlords had no objection, and it was not likely that they would—supposing that Wakefield or some other town in that enormously populated district found it cheap to deal with the Bradford vendors of water supply, two or three towns might thus be supplied. The corporation of Leeds would of course come and oppose them, but in the event of the scheme now before the committee being sanctioned, the answer would be that Parliament contemplated the promoters doing this in 1858; his clients would be told that in that year Parliament, having a full knowledge of all the circumstances—how Bradford was in difficulties, and so forth—it would be said, "Parliament intended that the water should be sold; what have you to do with the Wharfe?" The consequence would be, that a vast quantity of water might be absorbed or claimed in the course of three or four years, as these parties would have established a legitimate title to more water from the same source. Hence the corporation of Leeds thought that they had a real legitimate grievance to complain of. He hoped to satisfy the committee that the want of water at Leeds was very serious, very imminent, and that his clients had taken the necessary precautions to prevent their being shut out from a supply. His clients said truly, "Here is a change of the plan which will divert some of the springs and streams that now flow into the Wharfe, and will diminish the quantity if it does not injure the quality of the water on which we now depend." In addition to these contemplated new works, his clients complained that a large and new district was to acquire an interest which it did not want in the Wharfe, for it really did not appear that the people in these new places would take the water; but they had no claim whatever to the supply, whether they desired it or not. That their notions were correct on this subject was shown by a suggestive question put by his learned friend, Mr. Hope Scott, who, when a witness who seemed slow to appreciate the advantage of the water supply to the neighbouring villages, hinted "Keightley." Of course it was very likely that Keightley wanted water, and the witness said it was likely that it would take it from Bradford if it could be got advantageously. It was of no use denying that if this particular clause stood in the bill, the promoters wanted to supply customers beyond the present district; and if they were allowed their demands it was possible that the people of Leeds themselves would be obliged, in the course of time, to come in under the 3rd clause, and ask the corporation of Bradford to supply them with water. (Laughter.) He did not say that the danger was very imminent, but it was quite possible. What was to prevent the Bradford corporation, if it obtained the powers it now sought, from underselling Leeds in its own district under the 35th clause? He had now gone over the different points which the Leeds corporation desired to urge against the proposed scheme. They were perfectly satisfied, from the statements that had been made and the evidence adduced, that they were quite justified in the course they had taken. It had been necessary to appear against the preamble, because they resisted the necessity of the works, but they did not object to any part of the preamble except that clause. To the new works, to the alterations in the level, to the conduit, to the extension of the district, and finally, to the power to sell water without any limit whatever and in bulk, the corporation of Leeds, acting as they did in behalf of the interests of a large and important community, would offer a decided opposition.

Mr. HOPE SCOTT said he had prepared a clause (which he read) providing that the promoters would not compete with Leeds in its own district.

Mr. VENABLES said this clause had not been shown to him before, and, of course, it removed one of the objections he had been putting.

Thomas Hawksley, Esq., examined by Mr. VENABLES.

He said he was engineer to the corporation of Leeds, and was acquainted with the Bradford Water-Works. Before the works had come into the hands of the corporation there had been two contests between them and the company. In the first contest the water was to be taken wholly from the river Aire, and on that occasion both bills were thrown out. In the succeeding year another bill was brought in by the corporation, and the company thought that, having a regard to their interests, they should bring in a similar bill. The bill of the corporation was rejected and that of the company proved; but an agreement was come to that the works of the company should be transferred to the corporation, with all its powers and rights; and in the next year a bill was brought in by the corporation to enable them to effect this arrangement. From his experience he would say that the supply demanded on the occasion, 10,000,000 gallons daily, was excessive. It was so deemed at the time when the parties were contesting before Parliament; but as the corporation had come out with a large scheme, witness, who was called on to advise, gave it as his opinion that, unless the company came out with a scheme as large as that of the corporation, they would not stand on an equal footing; but it was perfectly well known by all concerned at the time that the scheme was far too large, and that if it was sanctioned by the committee it would be cut down by the company to the proper size. The corporation proceeded to construct the works of the company on the scale of magnitude sanctioned by the committee, whereas in his (witness's) opinion it would have been more prudent to have taken as much of the works as were shown in the part of the map coloured green, which would have been enough for a number of years, and to have omitted the other parts. Witness was first consulted about the Leeds Water-Works in 1854, at which time the corporation had already purchased the rights of the company, in whose hands the supply had formerly been. Witness, before this, had been engaged against the corporation on the part of the landlords. Witness recommended that the pumping-station should be erected on the river Wharfe at a point which he indicated on the map. That suggestion was adopted, and provision was also made for putting up four other engines, the object being to supply more water at a future time; and arrangements were made with the landlords with this view. They had no supply except from the Wharfe, and a small draining area of 1,500,000 gallons daily. They were limited to 2,500,000 gallons per day from the Wharfe, but he could at present erect works which could give an unlimited supply. They thought that 7,500,000 would be wanted, as the consumption of water was increasing not only from the increase of the population, but from a more liberal use generally by people of water. The consumption had increased 10 per cent. among the same population within the last twelve months, and at present there was provided for them at the rate of about 20 gallons per head, more water would soon be wanted, and the only available source to go to was the Wharfe. The valley of the Aire was out of the question. Witness had been engaged in effecting arrangements with the mill-owners. The corporation paid Mr. Sheepshanks by annual rates, amounting in a capital sum to £5600. The power to pump was unlimited, and as far as Mr. Sheepshanks was concerned he had no further claim upon the corporation, no matter what damage he might in future consider done to his mill. The next arrangement was with the Earl of Harewood, who was paid £3000 for the right to take 6,000,000 gallons daily; if this were exceeded they would have to pay more. The next was Mr. Montague, a mill-owner, who was paid £1500, the limit being 2,500,000 gallons daily. In all these latter cases there was an agreement that the corporation were not to be prevented from going to Parliament for powers to take a further quantity, but in that event the parties would be entitled to further compensation. The next was Mr. Hatchard, who had £3250 for 2,500,000. The next arrangement was with Lord Londesborough, and applied both to his mills and his estate generally. He was paid £3935 for leave to draw the same quantity, 2,500,000. In the event of more water being wanted the three last parties would have to be dealt with again. The quality of the water from these appropriated areas was very good. If the quality of the Wharfe was deteriorated it would not necessarily injure the mill-owners; but if from any cause a diminution took place in the Wharfe, the water would become more valuable. It was of considerable, not vital importance to the people of Leeds, that the water should not be diminished. Witness had examined the plans under the present bill. [He pointed out on the plans the additional area sought to be obtained by the promoters of the bill, and the different "becks" (brooks), to the number of eight, which would be interfered with, but which, under the existing Act, could not be touched.] Witness said that the proposal to alter the level so as to bring out additional water was in excess of the present Act.

By the CHAIRMAN: Witness considered that under the 6th section, as well as under the power to alter the works, the promoters sought power to bring water from the becks which they did not possess under the existing Acts. He objected to the construction of a conduit to bring down the water as proposed by the bill. They could not have taken the water before—the former Act was very express on the subject. They could not have made these works without applying to Parliament, if the owners along the river had been ever so willing. They might have dug a trench, perhaps, but he was not sure that they could have used it to appropriate water. Under the present bill they sought powers to deprive the Wharfe of water which otherwise would run into it.

By Mr. VENABLES: Witness had had great experience of water bills, and he knew of no instance of a general power to supply water in bulk. He was engineer to the town of Salford, and was aware that it was supplied in bulk by Manchester. Manchester supplied water to the gates of Salford, and the corporation of Salford appropriated it and distributed it. But that arose in this way—Manchester and Salford were formerly supplied by the same waterworks, which ultimately came into the possession of the former. Salford objected to Manchester obtaining any power over their district, and Parliament granted to Manchester no power over Salford, but the latter said, "As your works came here, we will take the water from you if you bring it up to our doors." He never knew any power granted to a corporation to sell water to any party out of their district. There were many objections to permitting corporations travelling out of their district.

Cross-examined by Mr. HOPE SCOTT: He only knew of one case, that of Manchester, supplying water out of its district. The corporation of Leeds thought that if the corporation of Bradford had the power of selling water, they would fall short of a supply, and would be obliged to go to Parliament again; and, having a further drain upon their works, they would want to make a further drain upon the Wharfe. According to the rain-gauge, it was estimated that under the Bradford Act 14,000,000 might be got for the appropriated district. The minimum fall of the Wharfe to the Leeds corporation was 20,000,000 per diem. The drainage area of the Wharfe was very large—about 160,000 acres—about 250,000 gallons from each 1000 acres. The flood yield was totally different. At present it was not of great importance to Leeds that the becks were appropriated by the Bradford corporation; but it would become of great importance if the corporation of Leeds were compelled, as they fully expected they would be, to carry a conduit up the river for water. Then it would be most important that the becks should remain intact. It was not a new project, the laying out of the Leeds works with a view of obtaining at a future time a more extensive supply. [Witness pointed out on a plan the leading features of the Leeds works, and admitted that Leeds wanted to get the streams which Bradford had not the power to take.] The corporation of Leeds had been driven to look to the valley of the Wharfe as the area from which to obtain water, and it might properly be said to be their valley. They were driven into the valley by the gentlemen who erected mills at Bradford and other places. If the catchwater had been constructed, there would not have been a power to take water. Of course, if those streams had been appropriated to Bradford by Parliament, the matter was settled, and Leeds would have nothing to say to it; but he was quite prepared to say that the streams had not been so appropriated, as Bradford had no power to take water to a greater extent than it was, according to the works, authorized by Parliament. He took the works as the measure of the parliamentary authority, and so did the Court of Chancery. He took the parliamentary deposited plan as the measure of the quantity that might be taken from the streams. The streams that were to be used should be marked in the plans of the works where the embankment was to be raised. The intended appropriation must be specifically described. If the Act of Parliament did not state in words the streams that were to be appropriated, the plans must be referred to for the purpose of explaining the Act of Parliament. This was the doctrine on the subject according to the standing order. There was no power of intercepting the stream at every point. [The witness pointed out on the plan the parts of the stream that could be appropriated.] He had not said that the word "embankment" should be written on the plan at the place to be appropriated, but he said that, according to the standing order, it should be specifically described on the plan. [Witness read the 43rd and 44th standing orders in corroboration of his

statement.] There were several variations in the present plan from the former one, which he pointed out.

The CHAIRMAN: Mr. Hope Scott says that there is no alteration.

Mr. HOPE SCOTT: We contend that we have the power under the former plans.

The CHAIRMAN: Then why come to Parliament for a power you already possess?

Mr. HOPE SCOTT: The plans are nearly the same.

Cross-examination continued: On looking at the plan for 1854, and comparing it with the present plan, witness did not see that they differed very materially; but there were clauses in the bill which differed, and gave more extensive powers than that of 1854, and he complained of that. He had no recollection of this question having been raised when he was before Sir William Cubitt, who made the award; but the question had not occurred to him only within the last 24 hours. It occurred about two months ago to the corporation of Leeds, who desired him to go down and look at the spot. In 1853-4 he had advised the company to bring forward a scheme equal, at least, to that of the corporation.

Mr. HOPE SCOTT: You gave evidence before Parliament?

Witness: I did.

Mr. HOPE SCOTT: So your private opinion was that the scheme was too large, and your public evidence was that it was small enough?

Witness: No. If I had been asked the question when examined, I would have stated that both schemes were too large. Part of the supply of Bradford was from the Aire district, which was capable of furnishing a sufficient supply for 200,000 inhabitants. The Manchester scheme was formed upon the supposition that that town, by its bill, would get about 30,000,000 gallons daily, and as that would be more than 60 gallons per head, it was deemed right that they should have the power of disposing of a portion of the surplus to Salford. When Manchester established its works, it was not intended that the supply should be limited to the then existing population. It went upon the principle that the population would increase, and that mills would go on spreading; and the same prudent principle was followed by Sheffield, which commanded a supply equal to 50 gallons per head. He would not be surprised if Hull had got 90 gallons per head, considering what Parliament sometimes sanctioned. He did not recollect the Glasgow estimate, but thought it was about 36 gallons per head, but a large portion of that was waste. The present population of Glasgow was 400,000, and the quantity obtainable would be about 30 gallons per head. Leeds had 20 gallons per head within the limits of the water supply, but in reality it would not be more than 14 or 15 gallons per head. The corporation of Leeds had constructed works to meet an unlimited supply. Manufacturing towns increased in population at the rate of 2½ per cent. per annum, but the increase of Bradford was greater—it had been 4 per cent. up to about three years ago. He believed the Manchester, Sheffield, and Lincolnshire Railway Company had obtained leave to sell water in bulk from the canals at Manchester. The River Lea Company had also obtained powers, but these were limited, and afterwards repealed.

Re-examined by Mr. VENABLES: Did not know of any case of parties being allowed to sell in bulk beyond their own district. The proposed supply of water to Bradford was superfluous. The corporation of Leeds objected to Bradford taking more, but did not at all object to its keeping what it had under existing powers, which were limited to the works they were authorized by Parliament to construct; and if these powers only covered 2,000,000 gallons, they had no right to extend it to 10,000,000. The objections of Leeds would be at once removed by the promoters undertaking to abide by their existing powers, and not to take more water, and they could not possibly be damaged by being limited to this. Witness adhered to his opinion that under the proposed scheme the promoters took 7 or 8 becks which were not authorized by the former bill; but if he should happen to be wrong in this view, they would still be able to take these becks if they had a legal power under their existing Act. He was satisfied that Bradford had no reasonable want of a sufficient supply of water for its present or future necessities.

Here some consultation took place between the parties on both sides, with a view of arranging some provisos for the settlement of the whole or a portion of the disputed points.

The CHAIRMAN said the committee wanted an exact statement of the financial part of the question, and of the distribution of the water by the existing Act, so that they might see what supplies Bradford would have if the amount remained as stated in the bill.

Mr. *Leather*, re-examined by the CHAIRMAN.

£200,000 additional was wanted for the works and all the elements of outlay connected with them. £26,750 was all that was wanted for new works; £24,000 for distributing the mains; £24,000 for probable excess over estimated cost in 1854; other items made up the sum of £165,000; and then parliamentary expenses and other unforeseen contingencies, £35,000, which brought up the sum of £200,000.

Mr. HOPE SCOTT then proceeded with his reply (the parties not having decided as yet upon the terms of the provisos to be inserted in the bill). He said that, with regard to the general principle of the bill, the promoters stood in this position, that if the committee did not help them nobody else could. The corporation of Bradford had committed them to this enormous expense. When the former bill was passed, he was counsel for the company; and it would be remembered there was a cry throughout the land that there could not be too large a provision of water for towns, and such figures as 50, 60, 90, and 100 gallons per head per diem for manufacturing towns was not deemed unreasonable when the great increase of population, as demonstrated in the case of Bradford, was considered. It would have been unreasonable to limit for ever the supply, and the grounds for that statement were obvious. All these streams, so much contended for, were seats of manufactures, of which water power was an essential element, and every year's delay would add to the difficulty of obtaining a sufficient supply to Bradford. In answer to any complaints from owners regarding the appropriation of streams for the use of manufactures, Parliament said this: "We must consider these great seats of manufactures as places which, in a sanitary, political, and social point of view, cannot be overrated; you must submit to the inconvenience of having these streams drawn upon, for if we delay even for a year or two it will be utterly impossible to obtain a supply." He would not say that this feeling had not been carried too far in some instances, but he doubted whether it had been carried too far in the case of Bradford; and he believed that, if the temporary depression had not fallen upon the town, there would have been little reason to say that the demand sought would have been very unreasonable. It had been stated by Mr. Leather that 2½ per cent. was the average increase of the population generally in manufacturing towns, whereas the ratio in Bradford was 4 per cent.; and that being the case, he did not think that the principle was carried too far. He was not surprised that Leeds should think it carried too far, for, not having been so progressive as Bradford, it was somewhat jealous, he feared, of the latter. But, after all, the question had been already settled. In 1854 Bradford was before Parliament for powers, and Leeds did not oppose; it was silent. It was not, perhaps, guided then by such sage legal counsel as that of his lordship, or his honour—he did not know how to address him—Mr. Hawksley, who was so good as to lay down the law of the Court of Chancery for the benefit of the committee. But the Leeds Water-Works were before Parliament again in 1856 to obtain a sanction to their existing supply; but their views were then understood and known, and a clause was put in providing that nothing in the Act should in any way affect the powers and privileges of the borough of Bradford. So that as late as two years ago the people of Leeds were before Parliament, and were in a position to raise this question, but did not do so. The corporation of Bradford did not ask Leeds to pay any of the expense of the contemplated works, and it was to be remembered that not a ratepayer petitioned against the bill. The question as regarded the finances was this: Would the committee leave Bradford sticking in the mire or give it additional powers to raise money to get out of its difficulties? The only additional sum that was wanted for new works was the trifling one of £26,000, which in a matter of this kind was really not worth mentioning; and £15,000 or £16,000 would remedy the serious inadequacy of the supply complained of by a portion of the inhabitants of Bradford. He would leave this part of the question confidently in the hands of the committee—he would say no more about it; he could not carry it further. His learned friend was anxious that the promoters should cut down the plan, but they could not afford to give up any portion of it as they were committed, and this money was embarked in it. He would for the present reserve himself on the point whether, under the powers of 1854, the promoters could take water from the streams that had been so often referred to. That Leeds should display hostility to the scheme was no argument against it; for, as he had said, it was thought that Leeds was sometimes envious of the progress of Bradford. Formerly, letters used to be addressed to "Bradford, near Leeds;" now, he believed, gentlemen had their letters addressed to "Leeds, near Bradford." (Great laughter.) His learned friend, he was afraid, had been influenced in the course of his observations a good deal by this feeling when he talked about the likelihood of Leeds going to hire water from Bradford. The very idea of this was considered as something too horrid to be contemplated with calmness; but, for his own part, he should have thought that if a plentiful supply of water could be got from Bradford in this way, and at an advantageous price, there was nothing so dreadful in it after all, and that it would be the best thing that Leeds could do. The promoters of the bill had agreed that water would not be sold by bulk within the limits of the water district supplied by the corporation of Leeds; that had been all settled satisfactorily by the proviso which he had introduced. But this did not content Leeds, which set itself up as arbiter on the necessities of people who were perishing, in a sense, for want of water. The question was not one merely of a commercial nature, or that affected a company, but the interests of a great community were at stake. The promoters considered that they would benefit even the district of Leeds; but with regard to other places he would say a word. The Leeds corporation asked, "What have the Bradford people to do beyond their own limits?" and their notion was this, as revealed by his learned friend: "You (Bradford) are so likely to have such a capital sale for water in bulk that your 10,000,000 will soon be insufficient, and we in Leeds are afraid that you will take more water from the Wharfe than you now propose to do." It was admitted that the promoters could get 10,000,000; "but," said Mr. Hawksley, "if you sell this water to all these districts, if you discharge your duty and supply water in bulk, you will soon have such a demand upon you that you will be obliged to come and take more water from the Wharfe, and therefore we (Leeds) object." He (Mr. Hope Scott) asked if this was a reasonable position to take? When the time came, Leeds might object if it thought proper. The corporation of Leeds was in no danger; they had made express provision in the agreement with the landlords that they would not be prevented from coming before Parliament for more water when they wanted it. When, however, Bradford came before Parliament in the same way, when it acted as Mr. Hawksley took care Leeds would act, then its demand for 10,000,000 was pronounced extravagant. The water that would not be wanted by Bradford would only be sold to people who did want it, and who would pay for it. Why should Leeds interfere? Leeds had made its own arrangements, and were populous places to remain dry and dirty because at some future time Bradford might go to the Wharfe for more water? The Bradford corporation at the present moment was possessed of the water; and according to all reasonable calculations, judging from the probable increase of the population before many years passed over, the question of water supply might become a very important one in Bradford. The only thing that the promoters asked for in the meantime was to apply profitably that water which neither Leeds nor Bradford wanted for itself. Mr. Hawksley wanted to run the water from the streams down to the Wharfe. Why? That hereafter when he came to deal with the mill-owners, from whom he would be taking more water, he would be able to say to them, "Oh! you have been already paid for it; the Bradford corporation have paid for it; we are taking it not from you but from Bradford." That would be the answer to the mill-owners. "Look at that reservoir"—[pointed out on the plan]—"that is money which has been paid down. We have bought it all from them; you want us to compensate you for so much water—it will not do." They would thus stave off the mill-owners, and leave Bradford unprovided. The question, then, resolved itself into this,—Whether Bradford, having bought and paid for all the water it could get, was in the meantime to be permitted to dispose of the surplus of it in mitigation of the rates, or whether the water was to run down waste into the Wharfe, in order that Mr. Hawksley might have a better means of settling with the mill-owners? With regard to the question of selling in bulk, it was settled by the cases of Manchester, with regard to Salford, the River Lea Company, and partially by the Manchester, Sheffield, and Lincolnshire Railway Company. Now, what was the utmost distance that the promoters proposed to take for selling purposes? Why, it did not exceed three or four miles; and a place like Bradford was not to be allowed to consider a neighbourhood of three or four miles as having any claim upon it. But, supposing that the distance was a few miles greater, what reason was there that the promoters should not sell privately that which they had bought with their own hard money? They were perfectly willing that Leeds should have this advantage in its own district, but it had no right to interfere with the fair and legitimate views of the promoters, in order that Mr. Hawksley might come up to the Bradford district, and get the water to flow into the Wharfe, and enable him to complete satisfactorily the arrangements with the mill-owners. He repeated that the question was already settled—the promoters were in possession—they had paid for the appropriation—and he asked the committee whether it would permit them to get out of their difficulty by sanctioning the bill, or whether it would swell those advantages which Mr. Hawksley would have in dealing with the mill-owners.

In answer to a question from the CHAIRMAN, Mr. *Leather* said it would take about £24,000 to complete the works on the upper district.

Mr. VENABLES said he believed that the committee would be called upon to settle the terms in which the necessary clauses which his clients desired

should be framed. What they wanted was effectually to secure that the promoters should not take any water from sources which they were not empowered to touch at present.

Mr. HOPE SCOTT said that surely his learned friend did not want to prevent the promoters from erecting works that would enable them to take water which they had a right to at present.

Mr. HOLFORD: If all the works were carried out, with the additions, there would still be a surplus of between £35,000 and £36,000.

Mr. *Leather* said parliamentary expenses had to be provided for out of that sum.

Mr. HOLFORD: How much would that be?

Mr. HOPE SCOTT: Five per cent., including the trifle paid to poor people like us (smiling). With regard to the question of selling in bulk, he believed the two sides could not agree. He would now say a few words about the becks. In the first place, what was done preparatory to obtaining a Water-Works Act was to deposit the plans and sections, with a book of reference; and upon these plans and sections were marked all the springs and streams that were to be affected by the bill. The book of reference contained the names of the owners and promoters. [Counsel read the standing order.] The terms of the former Act ran thus:—"The company may, from time to time, by agreement with the owners of any lands, purchase such lands, waters, and streams, and any easement, power, and authority," &c.; and then it was provided that for the protection of the several mill-owners there was to be compensation, and Sir William Cubitt was appointed to make the award. Sir William Cubitt made the award, and, beyond the streams included in it, no other had been appropriated. That surely cleared the ground to a considerable extent for the general principle.

The CHAIRMAN: The committee are to understand from you that you are not seeking for further powers than the former Acts give you. If that be the case, the Leeds corporation say they do not object.

Mr. HOPE SCOTT: We are seeking further powers for works, but not for water. My learned friend admits that we purchased the waters from the mill-owners.

Mr. HOLFORD: It is purely a legal question, if you do not ask for fresh powers.

The CHAIRMAN: The Lord Chancellor, as you call Mr. Hawksley, says that the plans must be taken with the Act of Parliament. (Laughter.)

Mr. HOPE SCOTT: We put in reservation all the rights of Leeds; we shall draw a clause saving their rights, in such a way as to make whatever we purchase ours.

The CHAIRMAN: If I understand the position of that beck [pointing to the Ivy Beck], it would not run down to the Aire, but to the Wharfe.

Mr. HOPE SCOTT: All these streams were included in the award. The learned counsel explained certain figures in the plans of the former Act, and which showed the streams that had been appropriated. These figures indicated that at the particular beck where they appeared, there was to be an embankment put down into the bottom. This was all that was required by the standing orders.

Mr. HAWKSLEY: Very ingenious.

Mr. HOPE SCOTT: "Very ingenious," says the chancellor. (Laughter.) Upon my word, I feel proud of the compliment from such an exalted source. (Laughter.)

Mr. VENABLES: Very well; if they have the power, let them keep it.

Mr. HOPE SCOTT said that, with regard to the other works that he contended might have been constructed by agreement with the land-owners under the existing Act, his learned friend said they could not execute these works except for the purposes of the Act, and that these purposes would not strictly be served by the proposed works. [Counsel read section 41 of the existing Act, beginning, "The company may from time to time, and in addition to other lands, waters, and streams, but only by agreement with the land-owners and other parties interested, purchase such lands, waters, and streams."] He submitted that Leeds had no special case to come there and oppose this bill, particularly as no mill-owner had made a complaint on the subject. If the committee would be good enough to indicate the principle on which a necessary clause should be drawn, the promoters would endeavour to meet the objection.

The CHAIRMAN: You may take it that the preamble is proved, subject to the introduction of certain clauses. We are of opinion that the promoters should be limited to the supply of water in bulk to certain districts. Perhaps you will prepare clauses providing that you will not sell more than 2,000,000 gallons per day, and that the minimum charge shall be 5*d.* per 1000 gallons for manufacturing purposes, and 1*s.* per 1000 gallons for domestic use.

The committee then adjourned.

FRIDAY, APRIL 16.

The committee met again to day at twelve.

Mr. JOHNSTONE said that clauses were prepared to meet the suggestions of the committee, but he was desirous of addressing the committee on the subject of selling water by bulk.

The CHAIRMAN trusted that the promoters did not intend to ask for more, as it was a very unsafe principle to admit corporations to be dealers in water; but, finding there were certain townships in the line through which the water runs, they thought it would be a great hardship if they did not get a supply as it passed by.

Mr. JOHNSTONE said he did not want to ask more.

Mr. PICKERING (on the same side) said: We agree to the two millions of gallons and the price, but require that the sale should be limited to five miles from the borough.

The CHAIRMAN: That is, that much would have more. What have we to do with five miles?

Mr. PICKERING: Then strike out the proviso at once.

Drafts of clauses were then handed to the chairman by counsel on both sides, and the room was cleared.

On our re-admission,

The CHAIRMAN said: The preamble is passed. The committee adopt Mr. Venables' clause, a proviso limiting the number of gallons to be sold, and a proviso enforcing the immediate commencement of the works at the upper level.

The following is Mr. Venables' clause, inserted in the bill, on behalf of the corporation of Leeds:—"That nothing in this Act contained shall authorize the corporation to take or appropriate any waters which, under the powers of the recited Acts, they could not have taken or appropriated; nor shall anything in this Act contained be held to prejudice or qualify in any manner the rights of the corporation of Leeds to a supply of water from the river Wharfe or its tributaries, or to preclude the said last-mentioned corporation from making any future application to parliament for powers to take an increased supply of water from the said river Wharfe or its tributaries."

The following is the proviso to be added to the 35th clause:—"Provided always that the quantity of water so to be applied in bulk beyond the borough shall not exceed in the whole, in a monthly average, the quantity of 2,000,000 gallons per day; nor shall any water so supplied beyond the borough be charged for at a less price than 5*d.* per 1000 gallons, in respect of water to be used for mills or trading purposes, nor at a less price than 12*d.* per 1000 gallons in respect of water to be used for domestic purposes."

The remaining proviso is to the effect that the works on the high level authorized by the existing Act shall be commenced forthwith, the necessary sum for that purpose to be applied out of the funds to be raised under the new bill.

The various clauses were then considered, and passed, after correction according to the above provisions; and the bill passed through committee.

Legal Intelligence.

COURT OF QUEEN'S BENCH,

WESTMINSTER, JUNE 3.

(*Sittings in Banco, before Lord* CAMPBELL *and Justices* COLERIDGE, ERLE *and* CROMPTON.)

HIGGS *v.* GOODWIN.

This was an action in which the plaintiff, William Higgs, sought to recover from the defendant, Daniel Goodwin, clerk to the Hitchin Board of Health, damages for the infringement of a patent granted to the plaintiff on the 28th of April, 1846, to make, use, exercise, and vend his invention of "The means of collecting the contents of sewers and drains in cities, towns, and villages, and for treating chemically the same, and for applying such contents, when so treated, to agricultural and other useful purposes." According to his specification, enrolled on the 28th of October, 1846, the plaintiff's invention consisted—1, in the construction of tanks or reservoirs, in which sewerage might be collected, and the solid animal and vegetable matters therein solidified and dried; 2, in the construction of buildings over such tanks and reservoirs, in which the vapours and gases evolved from the sewerage below might be collected and combined with chemical agents; 3, in the construction of apparatus for the distribution of chemical agents over the sewerage so collected; and, 4, in the use and application of chemical agents for the purpose of precipitating the solid animal and vegetable matter contained in the sewerage water, and also for the purpose of absorbing and combining with the gases evolved from such sewerage water, and the animal and vegetable matters contained therein or precipitated therefrom. After describing the construction of his tanks and apparatus, the specification proceeded thus:—

I will now describe the fourth part of my invention, the object of which is to precipitate all the solid animal and vegetable matter contained in the sewerage water from time to time run into one of my tanks before described, and to cause the vapours and gases arising therefrom to be condensed, absorbed, or combined with some other substances in the chambers above. For the purpose of precipitating the animal and vegetable matter contained in the sewerage water, I prefer to employ hydrate of lime, commonly termed slaked lime, which, as far as I know, is the cheapest and most efficient chemical agent for effecting this purpose. But the carbonate of lime and some others of the alkaline earths, either in their simple or compound states, as well as some other substances, may perhaps be employed for a similar purpose; but, so far as I know, the employment of any other substance than hydrate of lime will not be so efficient or convenient for effecting the purposes aforesaid.

He accordingly claimed (4thly) "the precipitation of animal and vegetable matter from sewerage water, and also the condensation, combination, and crystallization of vapours and gases arising from sewerage matter in tanks or reservoirs by the means and in the manner hereinbefore described." On the same day, the 28th of October, 1846, the plaintiff entered a disclaimer, in which, after reciting that since the enrolment of his specification he had found that some parts of his said invention therein described were not of much value, and he was therefore desirous of disclaiming the same, &c., he proceeded to alter the title of his invention, so that the same should be in these words:—"Treating chemically the collected contents of sewers and drains in cities, towns, and villages, so that the same may be applicable to agricultural and other useful purposes." He then disclaimed the whole of the first, second, and third parts of his invention, "and so much of the fourth part of the same invention as consists in the crystallization of vapours and gases arising from sewerage matter;" and he described the fourth part of his invention, as in the original specification, by stating that, "for the purpose of precipitating the animal and vegetable matter contained in the sewerage water, I prefer to employ hydrate of lime, commonly termed slaked lime, which, so far as I know, is the cheapest and most efficient chemical agent for effecting this purpose," but making no mention of "the carbonate of lime, and some others of the alkaline earths, &c.," which in his original specification he said "may perhaps be employed for a similar purpose." He then limited his claim thus:—"What I claim of my invention is, the precipitation of animal and vegetable matter from sewerage water by means of the chemical agent hereinbefore described." At the trial, which took place before Mr. Justice Erle, at the last assizes, it appeared that the Hitchin Board of Health, with a view to deodorize and purify the sewerage water which flowed into the river, had adopted a system of filtering, by which they got rid of the animal and vegetable matter held in suspension in the sewerage, and afterwards they submitted the sewerage so far purified by the action of hydrate of lime, commonly called slaked lime. By these latter means a chemical combination took place, and the impure parts which were held in solution were rendered flosculent, and precipitated to the bottom of the reservoirs. The reservoirs were from time to time emptied and the sediment removed, but it was not sold, and people were paid to carry it away. The plaintiff contended that this latter operation was an infringement of his patent, in which he claimed "the precipitation of animal and vegetable matter from sewerage water by means of the chemical agent hereinbefore described," viz., by hydrate of lime. On the other hand, the defendants contended that they had not infringed the plaintiff's patent, for they had not produced the manufacture contemplated by the plaintiff, but had only used hydrate of lime to deodorize sewerage water in a way which had been for years known and practised. The learned judge, however, told the jury that such a use of hydrate of lime in precipitating animal and vegetable matter from sewerage water was an infringement of the plaintiff's patent, and the jury accordingly found a verdict for the plaintiff.

A rule was subsequently granted to set aside the verdict and enter it for the defendant, or why a nonsuit should not be entered, upon the grounds,—1, that the undisclaimed part of plaintiff's alleged invention is not a matter for which letters patent can by law be granted; 2, that the plaintiff's specification is too large, inasmuch as it claims any and every chemical agent whatever, without specifying or particularizing the same; 3, that the plaintiff's specification does not state the particular chemical agent to be employed, nor the mode in which the same is to be employed; or why a new trial should not be had between the parties upon the grounds,—1, that there was no evidence of an infringement of the plaintiff's patent; 2, that the learned judge misdirected the jury in telling them that

the use of hydrate of lime for the purpose stated in the defendant's evidence was an infringement of the plaintiff's patent; and, 3, that it was proved that the plaintiff's alleged invention was not new, and was well known to others, and publicly and generally practised in the United Kingdom before the date and grant of the plaintiff's letters patent.

Yesterday and this day Mr. BOVILL, Mr. C. POLLOCK, and Mr. HINDMARSH showed cause against the rule, and contended that the plaintiff's patent was good, his invention consisting in the precipitation of the animal and vegetable matter from sewerage water by means of hydrate of lime. It was true that hydrate of lime had been previously used in cesspools, &c., to prevent fermentation, and so to prevent noisome smells, but this was the first time it had been used to cause the precipitation of the animal and vegetable matter in sewerage. That constituted a new invention, for which a patent could be maintained, and which the defendants had infringed.

Mr. LUSH, Q.C., Mr. WEBSTER, and Mr. GARTH were heard in support of the rule, and contended that there had been no infringement, for the plaintiff contemplated a new manufacture applicable as manure to agricultural purposes; but the defendants had produced no such article, and had used the hydrate of lime for an entirely different purpose, viz., to deodorize and purify the sewerage water, a purpose for which it had been long used.

The COURT decided that the plaintiff's patent was good, as being for a new manufacture; and that the direction of the learned judge was wrong as to there being an infringement. The rule would therefore be made absolute for a new trial.

It was then agreed that the facts should be turned into a special case, so that the parties might go at once to a court of error, instead of going there after a second trial.

HERTFORD COUNTY COURT.

TUESDAY, MAY 25.

(*Before* J. H. KOE, Esq., *Judge of the County Court.*)

HASELWOOD *v.* THE HODDESDON GAS COMPANY.

DAMAGES FOR CUTTING OFF A SUPPLY OF GAS.

Mr. BAYLISS appeared for the plaintiff, and Mr. CODD for the defendants.

This was a jury case. The action was brought to recover damages sustained by the plaintiff in consequence of the defendants "wrongfully cutting off the gas from plaintiff's school, contrary to his contract with them." The damages were laid at £30.

Mr. BAYLISS, in opening the case to the jury, stated that the plaintiff was the proprietor of a large school at Hoddesdon, having about 60 or 70 scholars. The school was lighted and heated with gas supplied by the defendants. The amount charged for gas for the quarter ending the 1st of February in the present year was disputed by the plaintiff, and he refused to pay it. The difference between them was only £1. 1s. 9d.; but, instead of summoning him for the amount, they sent him a threatening letter on the 27th of April, that if the disputed balance was not paid by the 3rd of May, the supply of gas would be cut off. The plaintiff, however, was a strong-minded man, and refused to yield to this threat. On the 4th of May, therefore, the gas was cut off from the plaintiff's school. This was a very summary way of proceeding, and a very unjustifiable way of attempting to enforce the payment of a disputed account. The plaintiff had been put to considerable inconvenience by reason of this arbitrary conduct on the part of the defendants, and he therefore sought substantial damages, which he laid at the moderate sum of £30. The plaintiff had tendered the amount which he admitted to be due, but the defendants had objected to receive it, and had brought a cross action for the recovery of the whole amount claimed by them. It would be necessary to refer to the other case to show the unjustifiableness of the conduct of the defendants.

Mr. *Haselwood* was then called, and stated that his school had been lighted with gas ever since 1849. He hired the meter of the defendants at 5*s.* a year, but paid for it quarterly. On the 27th of January this year, Mr. Prior, the secretary of the company, called to look at the state of his meter. That was four days before the expiration of the quarter, the quarter being up on the 1st of February. Mr. Prior said the meter had not registered so much as it did in the corresponding quarter of the previous year. He looked at the meter, and found that it stood at 110,800. On the 1st of November, 1857, it stood at 105,700, showing that during the quarter he had consumed 5100 feet of gas. The consumption for the corresponding quarter for the previous year was 17,800, the decrease, therefore, being 12,700. Mr. Prior said he was not satisfied, and that he should charge considerably more than the meter indicated. Subsequently (on the 8th of February) the meter was taken away by Mr. Hunt and Mr. Slip, and on the 15th a new meter was brought in its place. He had paid into court the amount due upon the 5100 feet, as indicated by the meter on the 27th of January, and also for 2000 feet in addition, for the period from the 27th of January till the 15th of February, the day the new meter was brought to the premises. The only sum left in dispute, therefore, was £1. 1s. 9d. On the 27th of April he received a letter, stating that if the amount claimed was not paid by the 3rd of May, the gas would be cut off. He refused to pay the disputed sum, and on the 4th of May the gas was cut off from his school. The defendants had evidently acted spitefully in the matter, for they did not take away the meter which he had in his house, which would not have caused him very great inconvenience, but they took away the one from the school, and thus sought to put him to as great inconvenience and expense as possible. The consequence of cutting off the supply of gas to the school was, that he was obliged to alter his school hours, and his school was thrown into confusion. He had two gas-stoves in the schoolroom, and had boarded up the old fire-places. He should think it would cost from £30 to £50 to replace the old fire-places, and he had paid about £30 for the gas-fittings and stoves in his school, which had now become useless by reason of the gas being cut off. He could account for the difference in the consumption of gas in the quarter ending the 1st of February this year as compared with the corresponding quarter last year. During the whole of the quarter ending the 1st of February, 1857, he had the schoolroom heated with two gas-stoves, which were put up in October, 1856. He had twelve young gentlemen remaining with him during the Christmas vacation that year, and he was therefore obliged to burn the gas and use the stoves during that period. But this last year he had only one pupil left during the holidays, and to save the expense of gas he was brought into the parlour to be taught. In consequence of the extreme mildness of the season this last year, he only had one gas-stove, and that was not fixed until the middle of November, and was not used from the 19th of December, when the holidays commenced, until the 27th of January. These circumstances were sufficient to account for the reduction in the consumption of gas.

Cross-examined by Mr. CODD: I will swear that I never told Mr. Prior that "the directors had robbed me, and I had robbed the directors, and he was a —— thief, going up and down robbing the public," or any words to that effect. I may have said to Slip, the manager of the gas-works, that I should not require the gas in the school during the summer months. I do not believe Mr. Prior told me on the 27th of January that the meter indicated that only 1600 feet of gas had been consumed during the quarter. I have not got any memorandum of what the meter stood at when I examined it, but I am sure the figures which I have given, and which I also gave in my letters to the directors, are correct.

Mr. *George Allen* and Mr. *Hunt* were called to speak to the damages. Mr. Allen stated that he had fixed the stoves for Mr. Haselwood, and had charged £8. 18*s.* Mr. Hunt stated that he had put up the gas-fittings for the plaintiff, and had charged £15 for them.

Mr. *Hunt*, in cross-examination, said: On the 4th of May, when I went with Slip to remove the meter, Slip drew the attention of Mr. Haselwood and myself to the rough state of the connexions. There was a quantity of white lead and other mixture, which had been used in joining the inlet-pipe to the meter. It is not our habit to use white lead in fixing meters. From the general appearance of the meter, I should say that the tube connecting it with the main had been disconnected from the meter, and connected again in a very rough and unbusiness-like manner.

Re-examined: When the meter was first put up, there were no gas-stoves in the school. But when the stoves were put up, I should say it would not be necessary to enlarge the pipe connecting the main with the meter.

Mr. *Allen* recalled: I am not aware the meter was displaced at all when the stoves were put up. If it had been, I think I must have heard of it, as my man put up the stoves.

Mr. *Richard Ward* was then called by Mr. BAYLISS, and produced a letter which he had received from the directors, in which they stated that they could not depart from their usual custom of supplying the meter at a yearly charge.

Mr. CODD objected that this was no evidence at all.

Mr. BAYLISS said the letter proved that the practice of the directors was to supply the meter at a yearly charge, and that was a strong argument that they were not at liberty to stop the supply of gas until the termination of the year.

His HONOUR intimated that the letter was hardly admissible as evidence.

Mr. CODD submitted that the plaintiff should be non-suited. There was no evidence of any contract by which the defendants were bound to supply the gas for a year. There was nothing to prevent his clients from stopping the supply of gas, after giving notice of their intention to do so, even if no arrears had been due. He cited a case tried at Liverpool before Mr. Justice Cresswell, in 1846, to show that a gas consumer might give notice to the company that he no longer required to be supplied with gas, and he contended that the company had a similar right to give notice to a consumer that they would not supply him with any more gas.

The JUDGE said the case cited by Mr. Codd was not at all an analogous one to this. The case must go to the jury.

Mr. CODD asked his honour to take a note of his objection. The objection was threefold: first, that the plaintiff should be non-suited on the ground that there was no obligation on the part of the company to supply gas to the defendant after the notice given on the 27th of April, and which terminated on the 3rd of May; secondly, that there was money due for gas supplied, which had been demanded, but not paid; and, thirdly, that the evidence respecting damages was too remote and inadmissible.

His HONOUR took a note of the objection.

Mr. CODD then addressed the jury for the defendants. He characterized the action as the most scandalous, barefaced, and nefarious action ever instituted against a body of men. He would prove that the meter had been tampered with, and that the plaintiff had admitted to Mr Prior that he had robbed the directors. The first question which the jury had to consider was, whether the company had wrongfully cut off the supply of gas. If they did not think that, there was an end of the case. If they thought the supply had been wrongfully cut off, they would have to assess the damages. And what damages was the plaintiff entitled to? He had not given any evidence of damages really sustained; but he asked £30 damages. For what? For not paying for his gas! He refused to pay what was due from him, and then, because the supply was cut off, he came into court and asked for £30. He coolly asked the jury to put their hands in the pockets of the defendants, and give him £30 for not paying for his gas! Assurance unparalleled! Audacity unexampled! The company could not be liable to pay the plaintiff the expense he had been put to for his gas-fittings; and he might just as well ask them to pay for his dinner last week, or the coals he consumed last winter.

His HONOUR said he had been horror-struck with the observations of Mr. Codd. There could be no justification whatever for the expressions he had used. Mr. Haselwood appeared to be a very respectable man, having a very large school, and yet Mr. Codd had thought proper to vilify his character in the most extraordinary manner.

Mr. CODD said he was perfectly justified in the remarks he had made, as would be seen by the evidence he was about to lay before the jury.

His HONOUR: It will be only evidence against evidence.

Mr. CODD: it will be for the jury to weigh the evidence. I protest against the observations which have fallen from the Bench, for the jury are to be the judges of the facts on the evidence submitted to them.

His HONOUR: You say it is for the jury to determine, but you determine the facts yourself, and attack the character of a respectable man.

Mr. CODD: I have only commented on the evidence I intend to give.

His HONOUR: I must say your observations appear to me to be most unjustifiable.

Mr. *Prior*, secretary to the company, was then called and examined by Mr. CODD. He stated that the gas burnt by the defendant during the quarter ending 1st February, 1857, was 17,800 feet, but for the corresponding quarter ending 1st February this year (less four days, the state of the meter having been taken on the 27th January) there was only 1600 feet consumed according to the meter. He was surprised at this, and asked Mr. Haselwood if he had been burning the gas as usual during the quarter. Mr. Haselwood replied that the stoves had not been put up till the previous day (the 26th January), in consequence of the mildness of the season. He called again two days afterwards, and examined the meter again. He found it had registered 500 feet in the two days. On the 5th February he called again, and found the meter had registered 1000 feet from the 29th January. On the 5th February Slip was with him. He asked Mr. Haselwood what explanation he could give to the directors of the enormous difference between the two corresponding quarters. Mr. Haselwood then said he had robbed the directors and the directors had robbed him, and added, "And as for you, Prior, you are a —— thief, going up and down robbing the public for the benefit of the company." He (witness) immediately left the premises, and reported this to the directors, and requested that he might not be again required to call upon Mr. Haselwood after such treatment. He had given no cause for the language used by Mr. Haselwood, and had never had any unpleasant words with him before. He was never able to see Mr. Haselwood's meter except in the presence of Mr. Haselwood, who kept it locked up.

His HONOUR: How much gas did you charge Mr. Haselwood for the quarter ending the 1st of February this year?

Mr. *Prior*: 6500 feet, against 17,800 feet for the corresponding quarter in the previous year.

His HONOUR: On what grounds, when you say the meter only indicated that 1600 feet had been consumed?

Mr. *Prior*: The charge was not made by me; it was the act of the directors. I told the directors what the meter had registered, and they did nothing in the matter that day. When they met again, I reported what the meter had registered subsequently to the 27th of January, and the directors were of opinion that more gas must have been consumed than indicated by the meter. Taking into consideration that Mr. Haselwood had not used his stoves during the quarter, they charged him 6500 feet up to the 27th of January, against the 17,800 feet of the corresponding quarter.

His HONOUR: Then it was a guess?

Mr. *Prior*: Yes; we are sometimes obliged to do so, for it is not an uncommon thing for a meter to stand still and not register at all. We then charge according to the corresponding quarter, unless there is some reason, as there was in this case, for reducing it.

Cross-examined: I will swear that Mr. Haselwood used the expression which I have imputed to him. Slip was present at the time.

William Slip was then called. He stated that on the 8th of February he removed the meter in the presence of Mr. Haselwood and Mr. Hunt. He called their attention to the state of the connexion of the inlet-pipe. The joint was daubed over with a mixture of white lead, red lead, and grease. The worm of the cap was very much worn, showing that the pipe had been frequently disconnected and connected again. He had been connected with gas-works from his boyhood, and he had no hesitation in saying that the inlet-pipe had been frequently disconnected from the meter. Witness then corroborated Mr. Prior respecting the conversation on the 5th of February.

Cross-examined: I do not know whether there were any boys present when Mr. Haselwood made the observation about robbing the directors. This question was pressed again and again, and his honour said the witness must answer "Yes," or "No," but he persisted in saying that he could not positively recollect. He believed, however, there were no boys present.

Mr. BAYLISS: Do you impute fraud to Mr. Haselwood in removing the pipe from the meter?

Witness: It is not for me to impute fraud.

His HONOUR: Do you say what had been done to the inlet-pipe indicated that the gas had been passed into the house without passing through the meter?

Witness: I do not say so.

His HONOUR: Do you believe so?

Witness: I believe the pipe has been tampered with.

His HONOUR: Do you believe the gas was let into the house without passing through the meter?

Witness: I say the pipe has been tampered with and frequently disconnected. I cannot go further than that.

His HONOUR repeated the question.

Witness replied that it was not for him to say for what purpose the pipe had been disconnected.

The FOREMAN of the JURY: Might not a person who was not a good gas-fitter make a bad joint, which would account for the appearance you have described?

Witness: Yes; but no person has any right to interfere with any pipe connected with the meter.

The FOREMAN: But people do so sometimes without any fraudulent intention.

Witness: But they have no right to do so without a servant of the company being present.

George Ingram stated that he was employed by Mr. Hunt to fix the meter in question. He did not use any white lead in fixing it. White lead was never used in such work. He saw white lead on the screw after the meter was removed.

George King, in the employ of Mr. Haselwood, was called to speak to the time the stoves were lighted, but he knew nothing about it.

Mr. *Allen*, of Hoddesdon, was then called as a witness by Mr. Codd, but his honour objected to his being examined again, as Mr. Codd had had an opportunity of getting from him what he wanted in cross-examination, when he was called by the plaintiff as a witness.

Mr. *Robert Paulson Spice*, a gas engineer of London, and who has the management of several gas-works, stated that it was a very rare thing for meters to be locked up, and that the usual remedy in London when a gas bill was not paid was to cut off the gas.

Mr. BAYLISS: This meter was in the school-room, and therefore locking it up would be a very proper precaution, I should think?

Witness: Yes.

Mr. CODD and Mr. BAYLISS having respectively addressed the jury,

His HONOUR proceeded to sum up the case. He remarked that the plaintiff had been put to considerable expense for gas-fittings and gas-stoves on the understanding that the company would continue to supply him with gas so long as he required it; and therefore it would be extremely hard if the company might arbitrarily refuse to supply him with gas without a sufficient cause. If a man refused or was unable to pay for the gas which he had had, the company might very properly cut off the supply; but in this case they had cut it off after a week's notice, when the amount claimed was actually in dispute, and had been arrived at by guess on the part of the company. It should be borne in mind that the company had an absolute monopoly in the supply of gas, and the plaintiff could not tell whether the company would ever supply him again. If the jury were of opinion that it was unjust and improper on the part of the company to cut off the gas, then they would find a verdict for the plaintiff, and say what damages he was entitled to. He was quite sure that the jury would regret, as he did, that there had been a controversy about the expressions alleged to have been used by Mr. Haselwood to Mr. Prior on the 5th of February. It had nothing to do with the question between the parties. Mr. Haselwood had kept a large school for a number of years, and had now 60 or 70 boys, which was a very large number for any private school at the present day; and the fact that he had now so large a number of scholars proved that he had a high and extended reputation, and that the people who sent their children to his school had a high opinion of his moral character. He was, therefore, very sorry to find that the character of a man with such a reputation and in such a position was attacked, and that the case was made in any degree to turn upon the point whether he used the expressions imputed to him by Mr. Prior, which he positively denied, and which had nothing to do with the real merits of the case.

The jury almost immediately returned a verdict for the plaintiff—damages £30, the full amount claimed.

The cross action brought by the company for their claim was dropped, each party paying his own costs.

IN THE ARBITRATION OF THE GREAT CENTRAL GAS CONSUMERS' COMPANY AND MR. ALEXANDER ANGUS CROLL.

(*Continued from page* 329.)

THIRTEENTH DAY.—THURSDAY, NOV. 19.

Mr. *Frederick Giesbers*, examined by Mr. LLOYD.

I am a civil engineer, and am at present managing the Great Central Gas-Works for Messrs. Prior, the contractors. They succeeded Mr. Croll on the 25th of July last. I have ascertained the quantity of gas lost and consumed on the premises, in consequence of my finding the leakage very great. I had several occasions to test the leakage previous to our taking the public lamps, and, finding the leakage so enormous, I did not like to take the lamps under the conditions proposed. It struck me that there must be a great leakage going on at the works, and I procured a meter from Mr. Pontifex and fixed it to the main, and ascertained the quantity consumed and the quantity lost on the works by means of that meter. When I went, there was no meter for measuring the quantity of gas used in the works themselves. The gas that was used for the purpose of the works came from the outlet-main, after it had passed the station-meter. Part of the gas for the lamps outside of the works was taken direct from the large main, without being passed through the yard-service, and this was not measured. I found that portion which could be measured to vary from 1800 to 2000 feet per hour, for the use of the works only. There was a considerable leakage then: the leakage goes on to the extent at least of one-half of the gas consumed for the works. The gas-fittings at the works were in such a state that I estimated it at half. We have corrected it since, and are still correcting it, by putting up entirely new pipes.

By Mr. MAY: That does not include the lamps over the gateway, and the consumption in my house and the house of my foreman, which I have estimated at 2340 feet per day of twenty-four hours. The 1800 or 2000 an hour is burnt chiefly in the retort-house and purifying-house.

By Mr. LLOYD: That was independent of the estimated quantity, and was 2340, as near as I can guess, for the full day for the lamps burnt about the yard, not connected with the yard main, but taken direct from the street main.

By Mr. BARLOW: This 2340 had passed through the station-meter, but had been taken from the street main.

By Mr. LLOYD: I estimate that quantity by taking the number of lamps burnt, and the number of hours they were kept burning, at 5 feet per hour: some of the lamps burnt more. I have made a calculation what that would produce in the year for gas consumed or leaked out on the premises. Taking the consumption of 1800 feet per hour, and taking the lights burning twelve hours, as the daylight is very much excluded, I make it for the measured gas 7,884,000 per annum, and for the unmeasured part 854,000; and I arrive at that by taking the daily consumption. We daily consumed 2340; multiplying that by the number of days, 365, I make it 854,000. I estimate that, if due attention had been paid to the fittings, 800 out of the 1800 might have been saved. I have not calculated the amount merely consumed for the purpose of the works.

By Mr. MAY: There is no deduction to be made for that burnt by the lamps; that would remain the same.

By Mr. LLOYD: It was the duty of the contractor to have kept those gas-fittings in order. In our contract it would be our duty. I cannot speak as to the former contract. When we came upon the works we found the retorts in such a state that we only made 4900 feet of gas per ton of Newcastle coal. Since the works have been got into order the average make is 9000 feet per ton, but still I have got some of the old retorts at work, which I cannot dispense with to keep up the supply; but when I had these faulty retorts out of action I have been making 10,000 feet per ton in the new retorts. We have been burning cannel coal. Without cannel coal our illuminating power is only fourteen candles sperm, 120 grains, at the works, which would be about twelve in the City, as near as the difference can be ascertained; and with the cannel coal we have been making more than 9000 feet per ton. We used the cannel coal because the works were in such a state that we could not keep up the supply nor the necessary illuminating power without it. The state of the works was such that the amount lost from clearing the ascension-pipes had been about one-fifth of the consumption of gas on the works. The make of gas has increased more than twofold. It required a great number of men to keep them clear, which is one of the reasons why the make was so low at that time, and the leaky state of the mains is another. The ascension-pipes were stopped, only allowing a small aperture, which the gas filled up in a short time, causing continual stoppages, and the retorts were obliged to be opened. We found we had a great number of pipes to take down. They were completely stopped up, and we could not clear them sufficiently to let the gas pass through. The retorts were cracked, and in some instances the apertures were as large as an inch and a half. To those two causes I attribute the diminution of the quantity made relative to the ton of coal. We are now giving gas of twelve candles of 120 grains illuminating power in the City.

Mr. ARCHIBALD: Did you make any experiments yourself to ascertain the illuminating power in the City?

Witness: No; we get the reports every day from Dr. Letheby.

By Mr. LLOYD: It is from Dr. Letheby's report I take that. We have daily reports from Dr. Letheby, by an arrangement made with him; but this is only of recent date.

By Mr. ARCHIBALD: They are signed for Dr. Letheby by his assistant. His reports were only for the time that we were using cannel coal, and we only left off using cannel coal two days ago. I have not got the report of Dr. Letheby for the last two days that we have not used it. The report is received in the evening.

By Mr. MAY: Our recent make without cannel coal has been as high as 9500 cubic feet. We use principally Wearmouth and Old Shields Row coals.

By Mr. LLOYD: While the repairs have been going on we have been put to great expense and inconvenience; we have been using something like 200 tons cannel coal, because we could not make enough gas, from the state of the retorts, to meet the general supply. The defects have all just been recently overcome; it is only two or three days since we have been in a position to work without cannel coal.

By Mr. MAY: Our cannel coal costs from 45s. to 47s. per ton.

Cross-examined by Mr. ARCHIBALD: I have not been connected with English gas-works long, but upon the Continent I had been connected with gas-works for about three years previous to my coming here, as civil engineer and assistant to the engineer who built the gas-works; but I was not in a managing position there—I was merely assistant. I had nothing to do practically with the manufacture of the gas. I merely had to do with the erection of the works. It is only since I have been in England that I have had practically to do with the manufacture of gas. I have been practically

engaged in the manufacture of gas since last July, when I came to the Great Central Works. I had not had the manufacturing department before. We are just repairing the fittings now, and the quantity of gas consumed at the works is from 1300 to 1500 feet per hour. We have consumed at the rate of from 1500 to 2000 feet since I have been there. The consumption goes on from four o'clock till seven or half-past seven in the morning. We ought to have used less, because we only have to light one half of the retorts, and the repairs done at night have been done by candlelight, because the gas-fittings were not generally available. We have used about 25 dozen pounds of candles. We have not been working much at night. We had, at first, daylight up to eight o'clock. We have now the whole retort-house alight for manufacturing purposes. I cannot speak as to the quantity used during the repairs. In these estimates I have only given the lamps which can be easily estimated. If you have two or three lamps in a bed you can easily estimate it. I have not got an exact account of those lamps. They were lit at night for the repairs, after we took to the works, and were principally in the retort-house and purifying-house. These quantities I have taken when we were not at work repairing. We had only taken to repair the last quarter, within the last four weeks, and the first quarter we only worked in the daytime. We took to those repairs in July and August, and the latter part of the repairs had been done by candlelight and gaslight. I should say for the repairs we have had about 6 burners, at 10 feet per hour. We had the whole of the retort-house lighted up from one end to the other, at least that which requires to be lighted. When we took possession we could not keep up the stock. We had two-thirds of the retort-house in use, and we had it all lighted up, because there were no means of shutting it off. We set it alight when it leaked out, in order not to cause an explosion. The fittings in the retort-house were in such a state, whether we lighted gas or not, we could not shut the gas off. The whole retort-house was supplied, and there were no means of shutting it off, whether little or much. As a gas engineer, I should say that the repairs could not be done in a day or two. We have been repairing for three weeks, and we have not done yet; that it cannot be done in a day or two is certain.

By Mr. BARLOW: These fittings could not be repaired in a day or two. We have now four fitters from the company at the works, who have been there three weeks, and have not yet repaired the services of the retort-houses alone.

By Mr. ARCHIBALD: There are five horizontal mains right through the retort-house, with burners at each end, and which burn all along. There are two on each side, and one at the top; the top can only be called a service. I do not think it could have been repaired in a week if it had not been taken down entirely. When we went there we found some retorts which we used. We did not make any inquiry of Mr. Croll as to what state the retorts were in. We took what retorts we found available. We picked out those in the best state, and those we used; and if they were in too bad a state to be lighted up, we took the greatest care, and put as many men on as we could put on. There were about thirty-nine pieces, which make about nine new retorts, in the yard. We have not suspended the repairs for a length of time. There was a strike among the bricklayers, but the works did not stand at all, as I took my yard labourers on. The yield of 9000 feet is the average, without cannel; it has been as high as 10,000 in the new retorts. The quantity of coal used varies from week to week. At the present time it is about 135 tons per day during the last week. We have only just lighted up the new settings. We have every scoop of coal measured and weighed, and the number of scoops taken, and the stock remaining at six o'clock in the morning, and from the station-meter we get the exact quantity made and the coal used. There is no difficulty about ascertaining the quantity in the meter. It is correct enough. It is the same meter we found at the works when we took them. It has been ascertained that it is correct by the manager, and his report has been sent to the company. We took each scoop in use (each gang of men have their own implements), and we take the weight of the scoop; then the foreman stands by and takes the number of scoops and shovels, and we check it from week to week, to see if the quantity is correct by the quantity remaining in store. There is only one scoop weighed. It is not practicable to weigh all. It is always checked by the quantity of coal actually taken into the works. I have assisted in taking the temperature of the gas, but not sufficiently regular to enable me to state exactly what it is. Mr. Wright is the consulting engineer of the company, and the alterations at the works have been made under his superintendence. He has been acquainted with all that has been done.

Re-examined by Mr. LLOYD: We have kept the average of 9000 feet for a whole week, and I have no doubt that the average is a correct one. I have obtained it by taking all the figures, and adding them up and dividing them. About 9000 has been the average of a week's make; that I can safely state. If the coal has been wet or of an inferior description, when we have had to purchase in the market, not being able to get our steamers up in time, they have made us come down as low as 8500. On other occasions it has gone up as high as 9500; and in one case, with the new retorts, we have had it as high as 10,000. The pressure varies according to the day of the week, and the state of the weather. On Tuesday, for instance, we raised the pressure. We raise the pressure at the present time at three o'clock in the afternoon to about 15-10ths at the works. It entirely depends on the variation in the weather. Then we raise it at four o'clock to 25 or 27-10ths; then from four to five o'clock it rises from 42 to 47 on the 26-inch main, and from 33 to about 36 in the 36-inch main. At five o'clock it is the highest, and the pressure is kept up till six, or a quarter past six; then it gradually goes down till half-past seven; and at half-past seven it comes suddenly down to the night's pressure. If we had a very high pressure before, we go down to as low as 9, and sometimes 8, because the pressure is backing up against us, and in the City we have the pressure high. We raise it again at half-past three in the morning, from 7 or 8-10ths to 9 or 10-10ths, as we find the gas backs up against us. We have been giving 7-10ths as the low pressure, and we have risen 2-10ths for the markets, in order to keep it as much as possible at the same pressure. I have not got the pressure-papers here. The last week would not be a fair week, because we had cannel gas in order to keep up the supply, and then we had a lower pressure. The quantity of gas used in the course of the repairs is not included in the 1800 or 2000 feet. We have used that when none have been going on, varying according to the pressure on the mains. I have repeatedly found this to be the consumption in the dead of the night. The whole length of the retort-house was lit up when we first took the works, but we soon stopped up those parts that were not available, and we tried to get over the leakage as much as possible; but then I have not measured at that time. I do not know what quantity we might have consumed when the leakage was the worst. I have only measured for about four or five weeks. The leakage is now partly remedied.

By Mr. BARLOW: In the measured quantity of gas, I do not think there were any external lights; except quite lately, we have had one or two stand-pipes, which has nothing to do with the measurement. If there were any, they were very few; they were all out of repair when we took to the works, and we could not get a light. I beg to observe, this is what is principally used for the quarter we have now in hand; we have used principally candles to give a light, because the gas-fittings were not available.

By the UMPIRE: There were cracks in the retorts in proportions of an inch or more, which we had to fill up. From the state they were in when we had to light up others in order to keep up the supply, they must have been more than one year at work. I cannot speak as to the cracks—they gradually increased; I cannot speak to the time they existed. The retorts have been patched up by us in order to keep up the supply of gas.

By Mr. BARLOW: It often happens that a clay retort will crack the first time it is heated, and it fills up by the carbon from the gas; as soon as it exceeds a certain size, you are obliged to fill it up with clay. We filled the cracks up each time as soon as they were capable of that; if that could not be done, we bricked the whole retort up beyond the cracks; and it is principally owing to these short retorts that we have made a very small quantity of gas per ton. We never allowed more than from 15 to 20 minutes for the purpose of repairing these cracks before charging the retorts. The ascension-pipes were stopped up by a deposit of carbon from the gas. It might have been forming eighteen months or two years; it depends entirely on the care taken with the pipes, keeping the pipes clear at first. We cleared the carbon away, as far as we could. We either put up an auger-rod and "jump" the pipe, as it is termed, or take off the cap on the top of the pipe and burn it out. It can only be burned out when it is rather of a pitchy nature; as soon as it is a hard carbonized matter, it can only be cleared by forcing a sort of auger-rod through it. We cannot see, by the nature of the deposit, how long it has been accumulating. It would appear in the same state if it had been exposed to the flame of the gas. Frequently it will get to a mass in a comparatively short time. If it had been less exposed to the gas, it might have been two years old. To repair these cracks and remove the deposit would have entailed a great deal of labour upon us, and twenty minutes or a quarter of an hour between each charge would be lost, and labour besides. I have only six old beds now. They are not yet perfectly clear, and will not be right before I have got these six old beds out of work. I have been obliged to take the fronts out from the bottom settings, and clear the beds entirely, which were full of deposit.

By the UMPIRE: I have a certificate from the Polytechnic Institution in Berlin, where I was studying for three years. The plan of these works is not novel to me, as far as the working is concerned. They work the clay and iron retorts together; those I had not seen done before; that is the only thing I found novel in actual working. I had a knowledge of the setting, and the circumstances connected with it, before, but I had not seen it in actual work. There is no novelty, and in order to remove any doubt as to this, I must inform you that, though I have been the managing engineer for Messrs. Prior, yet we have engaged a practical manager for the company, who has worked these works for years before.

By Mr. ARCHIBALD: The name of the manager is William Scoble. He has been the manager of the works for some years past. I went there on the 25th of July, before Mr. Croll left. We commenced at six o'clock in the evening on the 25 of July; after six o'clock the works were conducted on our account. We found out these cracks and stoppages the same day, after Mr. Croll left. We did not send to Mr. Croll to come and see the state in which we found the dilapidations. I do not know whether any one did; we had nothing to do with Mr. Croll whatever. He had no relation to us; we did not take anything from Mr. Croll. It was an acknowledged fact between the company and ourselves, so that I did not think it right to make a report about it till the engineers appointed by Mr. Croll and by the company came to examine the works. This was in August to the best of my recollection.

By the UMPIRE: The retorts were not in a state to be repaired; they had to be taken out entirely. The expense of putting them in perfect working trim comes to some thousands. Our contract with the company is to refit the beds at £165. 10s. per bed, the company finding all the pipes and connexions. There are 22 beds, and there is some expedition-money for the first beds. The first eight beds would come to £200 per bed. I should say that the retorts will cost the company something like £6000. That does not include the roof, but only the retorts, the benches, fittings, and everything connected with the retorts and pipes.

By Mr. BARLOW: The system of setting clay and iron retorts together is new to me, and also the system of setting one over the other. We are not repairing them now on the same principle; we are putting in clay retorts, and, instead of crooked rising pipes, we are putting in vertical pipes, in order to prevent the collection of carbon. It is impossible to bring a great number of pipes up without bending them in all sorts of ways between the retorts. That increases the liability to choke. The straight ones are liable, but only in the mouthpieces, where they are easily cleaned.

By the UMPIRE: There were two station-meters when I went there, and then I got an 80-light meter to test the consumption at the works. The two meters that Mr. Croll left I found to register accurately.

Mr. MAY: He stated in the former part of his evidence that they had been recently examined.

Witness: Yes; soon after we took possession.

Mr. BARLOW: And he found the water-line correct.

Mr. *W. Mann*, examined by Mr. LLOYD.

I am the engineer of the City of London Gas-Works, and attend here under a subpœna. I have been practically acquainted with gas-works in the City for eighteen years. I do not know much about the mains of the Great Central Company, as I have nothing to do with the laying of mains. I know that they have a trunk-main from the works to Aldgate before any connexion is put on. They then begin to spread out to supply the City. From my experience, I should say that about 20 per cent. was a fair amount of leakage in my own mains, but I cannot speak as regards the mains of this company. I beg to say, however, that this is an approximation only, and is not defined as it would be if we had a station-meter. I ascertain it by checking the gasholder. We have many times tried the quantity of gas made, especially since the clay retorts have been used, and we generally find that it is approaching 9300 feet into the holder with Newcastle coal. We work at various pressures. The highest pressure at the works just for an hour in the evening, is 2½ inches; but that is only the distributive pressure; the average pressure in the district does not exceed an inch. Twenty-five-tenths at the works and ten-tenths of average service-pressure. If the centre of the works themselves was removed to Aldgate, the pressure required would depend on the way in which the pipes were laid. I do not know that we should require more pressure; in fact, we should not require more pressure there than anywhere else, if the pipes were laid in accordance with the necessities of the case. A long main from the works to Aldgate would require great pressure to overcome. I should say the pressure would far exceed 2½ inches at the works in order to have an inch at Aldgate, or less than an inch at Aldgate; but then the mains must be very beautifully

laid, so as to have an inch distributed all over the district. We aim generally at having an inch pressure everywhere, and therefore we are obliged to exceed that in some instances, in order to get that at the lowest point. Never having had experience of such a distance, I cannot say what would be the pressure 2½ miles off to get the requisite pressure at Aldgate.

By Mr. LLOYD: In the 20 per cent. which I have estimated for leakage there is more than mere leakage included. There is the loss by condensation, and what we pump out at the syphons in the streets which left the works as vapour. All that must reduce the bulk of gas, but how much is actually due to leakage out of the pipes I do not know. The term leakage includes condensation.

By Mr. MAY: It is unaccounted-for gas. We are paid for 7500 feet at the consumer's meter if we make approaching to 9300, and of course the loss is easily ascertained. We are taking steps that will very much reduce the leakage. We are making arrangements at our works to shut our mains during the day. There are certain mains even now shut out, and we shall extend that, so as to reduce our loss very much. Our actual loss of unaccounted-for gas up to the time we made these alterations would be as I have stated, viz., that if we make 9300 feet we should be paid for 7500 feet. That is no secret: the balance-sheet shows the amount of gas accounted for; the other is a matter of practical approximation as regards the quantity made. I certainly should not think much of the carbonizing account if it did not exceed 9000. In all the experiments I have made I have always exceeded 9000, and it has been since the clay retorts were used in order to ascertain the quantity of gas made by them.

By Mr. LLOYD: I am connected with one of the rival companies, and had no wish to appear here on that account. I am no volunteer in the matter; but, attending here on an order, I speak what I believe to be the truth.

By the UMPIRE: Before I came here I did not communicate my sentiments to any one, though I have spoken respecting my notion of the quantity of gas made and lost.

Cross-examined by Mr. ARCHIBALD: We make our own gas, and do not get it from contractors. We have no station-meter, and therefore the mode of ascertaining the leakage is a rough one in comparison. If we had a station-meter the fair way of ascertaining our loss would be to compare what was there registered with the returns from the consumers' meters. The return would give the unaccounted-for gas by condensation, leakage, and any other cause. Our district is not so extensive as the Great Central. In making the experiments to ascertain the quantity produced, the size of the holders is well known, and the quantity in height is measured carefully so much per foot, and we know what the holder contains. We made our experiments many times, twelve hours at a time, two or three days following, and at different times of the year, generally during the summer months. It is an average of the experiments.

Mr. MAY: The note, as I have got it down, is, that out of every 9300 feet made, they got 7500 feet brought into charge at the consumers' meters?

Witness: There is no question about the latter figure. The other rests simply on my means of ascertaining the facts.

Mr. ARCHIBALD (after handing the papers to witness showing the dimensions of the mains of the Great Central): Is the quantity of unaccounted-for gas in the first year (in round numbers, 40,000,000 feet) sufficient to cover the leakage on the increased quantity of gas manufactured in subsequent years?

Witness: I do not see, without any increase of pressure, or the mains becoming more defective, why the leakage should be greater one year than another.

Mr. MAY: Will you allow me, as I want to understand the question as well as the witness. If I understand, your question is this,—Is the absolute quantity of leakage in the first year of 40,000,000, in round numbers, a sufficient allowance for the last year, which contains half as much again?

Mr. BARLOW: Before Mr. Mann answers the question, his attention I think should be drawn to the fact that there are forty miles of mains of an average diameter of seven inches, and fifteen miles of an average diameter of two inches.

Witness: It depends to some extent on this, whether it is necessary to increase the pressure at the works for the extra quantity of gas; that being the case, the leakage would increase. Assuming the pressure to be the same, I do not see why the leakage should be increased. Supposing the whole was measured and brought to charge, excepting the public lamps, there is no reason why the leakage should be increased, without it can be shown that the mains are not in so good a condition as they were in the first year. The pressure remaining the same, the leakage would be the same. I can hardly say, looking at the dimensions of the mains, whether any increased pressure would be required in distributing the larger quantity. I do not know enough of the system of the mains of the company to be able to speak to that. We need to know all the ramifications and the draught at different points, to understand whether the mains are large enough for the quantity.

Mr. MAY: Do I understand, Mr. Archibald, that your question to the witness is, whether that quantity of leakage is sufficient, the mains all remaining the same. That is an hypothetical case, and not an actual one. The mains do not remain the same, inasmuch as for the distribution of 249,000,000 you get new consumers and new districts.

Mr. CROLL: The services have been increased.

Mr. MAY: Were the mains not increased in the five years?

Mr. CROLL: No; I put it as a complaint that they were not sufficiently increased; and I required another main from the works to the City.

Mr. MAY: I want the positive fact; do you mean to say the mains were not largely increased between 1852 and 1857?

Mr. WRIGHT: In 1853, to light the public lamps, there was a considerable increase.

Mr. CROLL: That is not so. The only extension that has been made to the mains has been a portion of the 36-inch main, so as to reduce the pressure given at the works; and the mains for the public lights were laid on, the greater portion, if not all, during that comparison year, between 1851 and 1852.

Mr. LLOYD: We did not supply the public lights at that time.

Mr. CROLL: But we took the contract in 1851 for the whole lights in the City, and at that time we laid a great portion of the mains for the lighting of the City district. Afterwards an arrangement was entered into between the Great Central and the City Company, that the City Company should retain the public lights, but we had in the meantime laid the mains.

Mr. MAY: I can plainly see from the nature of the mode of examining the witness it will be necessary for us to have a return of the number and the size of mains in 1852, and the number and size and length of the mains in 1857, because we are getting into confusion. You are asking the witness this question, here is a leakage in 1852 of 40,000,000, on a consumption of 240,000,000, and you ask the witness this question—Supposing the mains to be of such a size, and to remain the same at the supply of 338,000,000, should the leakage be more than 40,000,000? It is an hypothetical case, an I have no objection to your putting hypothetical cases; but we have to deal with facts here, not hypotheses; and therefore I feel it my duty to ask the witness whether in five years the gas company's mains being extended, and the consumption being increased 50 per cent., the leakage should remain stationary or be increased?

Witness: It would increase, I should say. I do not think it would have anything to do with the quantity sold; it would have more to do with the age of the mains, and the ground being disturbed in connexion with them from repairs of sewerage, or something of that sort, or one company disturbing the other one's mains in looking after escapes, and all these matters. A larger leakage from an increased supply would not necessarily arise without the pressure is increased in the mains. But, if you take a certain period, say five or seven years, and ascertain the leakage of the first year, and take it again at some other period later, you will find that the leakage most likely will be increased. I do not see that the joints will ever improve; if they are not good at starting, they will not improve certainly, because any settlement will render the joints less tight, and the chances are that a main will settle to some extent. Taking the fact that the mains have increased, and that there is a greater number of service-pipes, it will certainly have an effect upon the leakage—that is to say, if, instead of 50 miles of mains, they lay down 60 or 70, you may expect an increase, and of course the older the mains and the meters get, there will be a larger amount of gas unaccounted for. Sometimes meters become stationary. They do not stop in one hour or one day; they are a month stopping. By-and-bye they stop, and we know by the non-registration that they are out of order; but we do not know, when they are out of condition, if it is 4 or 5 per cent. or 10. In our company the consumption is increasing, but in the ratio of leakage we are improving, in consequence of the attention we pay to our mains.

By Mr. LLOYD: I do not know the amount of our rental, but I can tell something about the quantity of gas. It is 360,000,000 feet. I have nothing to do with the counting-house, but I think some of the gentlemen who have seen the printed balance-sheet can answer that. I do not know the mileage of our pipes; it is less than the Great Central, but our rental is higher.

By Mr. ARCHIBALD: The actual quantity of our unaccounted-for gas has decreased, and the per centage also. I assume it to be so. I have no means of ascertaining the fact directly, as we have no station-meter; but we sustain our rental with a less consumption of coal in carbonizing. I attribute the decrease to the mains being less leaky.

Mr. ARCHIBALD: Suppose, as you have had a hypothetical case put to you, the mains were originally imperfectly laid, and bad joints discovered from time to time and repaired, would it have an influence on the quantity of leakage?

Witness: It would influence it. Our leakage was very small. The laying of the Great Central mains has disturbed our mains and increased our leakage. We have had to repair that mischief since, and make arrangements to decrease the leakage that was becoming rather terrific from the circumstance that the mains were side by side in many instances; in fact, nearly the whole of our mains were uncovered from sewers-making and other things. They have been hung in chains many times, but by increased vigilance in repairing defects we have decreased the leakage.

By Mr. LLOYD: I speak of the decrease of the actual quantity relative to the maximum, but I can hardly tell what the maximum has been—perhaps 25 per cent. I do not anticipate we are much below 20 per cent. now, but I think we shall be from arrangements we are making.

By Mr. BARLOW: Our company was incorporated in 1817, and our mains have been laid at different times between that period and down to within a very recent one. We never did supply the whole of the City. I do not know how many years ago it is since we first began to supply that portion which is our district. It is only a matter of history, as far as I am concerned. It must have been within a year or two of our incorporation, so that many of the mains have been down for thirty years. I cannot tell what was the per centage of leakage ten years ago, nor before that, as no record was kept.

The UMPIRE: In your judgment was it more than 25 per cent.?

Witness: I think it was much less than it has been since.

By Mr. BARLOW: I cannot say whether it was 10 per cent., but I have every reason to believe it was less from the peculiar arrangement of our mains. I have no reason to believe it was 10 per cent. I cannot answer the question definitely. I know the peculiar arrangement of the mains of our company would make the leakage very small, because we had two sets of mains, and all the lamps were supplied by one set, which were only charged from sunset to sunrise. We have one set of mains for the public lamps, and another set for the private consumers. The pressure which we give on the meter-main would depend upon the circumstances of the district. The night pressure on the public-lamp-main was 8½-10ths, and on the meter-main 25-10ths throughout the twenty-four hours. I cannot speak positively to that matter, however, because it was then under Mr. Church's superintendence. Our works are nearly at the lowest portion of our district, a large part of which is at a higher level. We should have a greater pressure than 25-10ths at the highest level.

By Mr. MAY: I have been at the City Gas-Works eighteen years—since 1840.

Mr. ARCHIBALD: Have you, since the Central mains have been laid, heard of escapes from them?

Witness: I have said that I know very little about these matters, as the superintendence of the mains is in other hands, and complaints respecting escapes of gas would not come to me.

Mr. *A. A. Croll* recalled, and examined by the UMPIRE.

Between June, 1852, and June, 1857, the mains were not increased to any extent. I believe we tendered for the public lights in 1853, and obtained them. I should say during the above period there was only a half a mile of small mains, of two or three inches bore, laid down altogether.

By Mr. MAY: That includes mains of all sorts, large and small.

Mr. *Mann's* examination resumed.

I have heard Mr. Croll's answer, and I think that additional length of main would not affect the matter at all.

Mr. CROLL: Allow me to say that it has just been whispered to me that a small portion of the 36-inch main between the works and the City was laid in 1852.

The UMPIRE: What is the extent of it?

Mr. CROLL: About half a mile, I should say.

Witness: That would alter the leakage, but I can hardly say to what extent. Of course, I presume that the main is well laid in ground that is not at all disturbed.

Mr. CROLL: There are no services upon it. It is 1300 yards of 36-inch main, for the purpose of relieving the pressure in the City.

Witness: It would simply, then, be the leakage of such a length of main,

which, if well laid, should be *nil*. One would balance the other. The relief it would give would decrease the pressure on the other portion.

By the UMPIRE: The works being two miles and a half distant from the consumption, the quantity of gas would be diminished in passing between the two points. To what extent I can hardly give an opinion. It is a very large main, and all depends upon how it has been laid.

By Mr. ARCHIBALD: Assuming that it was well laid and properly attended to, the leakage ought not to be great. I should hardly like to say how much, as I have nothing to guide me in respect of such a pipe. It is laid in quiet ground. A great portion of it is simply under the foot-way, where it cannot be much disturbed, and is put down without leaks. I do not see why it should leak more now than it did then. Something is due to condensation, but it has never been ascertained how much we lose in that way under any circumstances.

Mr. ARCHIBALD: Mr. Croll suggests a question: Supposing that the gas, in passing along this long main, had cooled down and condensation took place, would there not consequently be less condensation afterwards in distribution to the consumers?

Witness: Yes, of course; all the condensation at every point must lessen it as it advances; it will not go on condensing until it has all gone, at least not in any reasonable time. Whether the volume of gas would be increased again in passing through the meters at the consumers' houses would depend upon the position of the meters, whether in a warm or cold place. A great many of them are in areas, where the temperature remains the same—that is, at the ordinary temperature.

By Mr. MAY: In our company both sorts of meters are used, wet and dry; in fact, we have no control. If a consumer wishes to have a dry meter we supply, and the same with the wet. There is no meter more accurate than the water-meter if let alone, but they are very often interfered with and made inaccurate. The dry meters could not so easily be interfered with. We are to some extent bound to supply the meter which the customers ask for. There is no particular choice. I think in many instances we should prefer dry meters to wet meters, if we had reason to suspect the customer.

By the UMPIRE: The distance of the works makes all the difference as regards pressure. I cannot tell what would be the difference. With reference to the works at Bow, I do not know what the pressure is there at starting. If the works were at Aldgate instead of Bow, they would only require the pressure they have now at Aldgate—say an inch or an inch and a half. I should say it would not take less than from three or four inches pressure to supply an inch at Aldgate. I only give a rough guess; I have never made any investigation.

By Mr. BARLOW: I have had experience in the use of clay retorts. They are always liable to crack from the commencement. We have an exhausting machine in use with them, so that no pressure at all takes place. Supposing a piece of the retort falls out, we can mend it. The ascension-pipes are more liable to stop with clay retorts than iron retorts, at any rate with the heat we used to work iron retorts at times. It is an accident to which we are liable. A change of coal would make all that difference. A crack in a clay retort would not stop the works. The failure of the exhauster would be more liable to do so than anything I know of.

Alexander Wright, Esq., examined by Mr. LLOYD.

I have had 25 years' experience as a gas engineer, and have been acquainted with the manufacture of gas apparatus during that time. I am now the engineer of the Western Gas Company and consulting engineer of the Great Central. I reside at the Western Works, and have the management of the practical engineering details. I have given my attention to the question of what is usually termed leakage. The term leakage is usually applied to the difference between the account shown at the station-meter, or the quantity of gas estimated as having been made, with that which is returned in account, either from the registration of smaller meters, or from some estimate of the quantities burnt by contract, as in public lamps, or otherwise. I know the station-meters at the works. I may say that probably I have peculiar means of knowing what station-meters and others are, inasmuch as I am a considerable manufacturer and have made large meters. I understand their construction, and I have written the history of the gas-meter for the JOURNAL over which Mr. Barlow presides. I do not know in what state the meters were at the works. I was not there at the time that they were given up by Mr. Croll to the contractors. I had never been on the Great Central works previous to that, except on one occasion, and I paid very little attention to it. Unless under special circumstances, the meter would accurately register the quantity made. I have no doubt of that, as the maker was Mr. Crosley, who is an accurate maker; but unless I know in whose hands the station-meter was placed, I should not put implicit faith in its registration. The station-meter has, usually, an overflow-pipe, and therefore it would appear, on the first glance, that it never could measure too much, nor, in fact, register a smaller volume; but inasmuch as most meters are supplied by a pipe with water, it is quite possible that that pipe might supply a larger quantity than the overflow-pipe could take away, and it is quite possible that the overflow-pipe might be stopped; therefore it is impossible to say whether the meter gave an accurate representation, unless I know the whole of the circumstances during that time. As respects consumers' meters, I believe that companies generally possess a disposition to be liberal to consumers. Independent of that, there are always a number of meters going out of repair, not registering, or partially registering. I would allow 2 or 3 per cent. as a fair reduction of gas that could not be brought to charge under that head, more especially as the meter becomes old, wet or dry. In making that allowance, I speak from my own observation and experience as to the loss which arises. I have a number of meters that are brought in, and, if they are water-meters, in some cases the metallic portion of them may be decayed; if they are dry meters, the leather in some cases becomes holey. In fact, the first day that a dry meter is set up, it is generally full of small holes, and it is only stopped at the top. It is entirely a question of how long the leather will last; but taking that into account, they will measure an absolute quantity less some 2 or 3 per cent., the turn of the scale, as you may call it, the same as a ton of iron at the works would scarcely weigh 20 cwt. if taken to 20 different people. This is through the general dilapidations, and independent of any wilful tampering with the meter, or illegal appropriation of gas. I must say that the number of cheatages of gas in my own experience has been exceedingly small indeed. It is only a question of meters. I am a disbeliever in cheatages; my own experience would gainsay it. My reason for saying so is this,—that in cheating by the meter the consumer may at any moment be pounced upon by the inspector. If he perforates a hole in the meter, it will show it when the inspector comes back; and if he attempts under these circumstances a fraud, it will be discovered. There have been a few cases of fraud, but, in my experience, very few. Another item included in leakage is condensation; that is a point on which I have been very particular indeed, inasmuch as I had some years ago turned my attention specially to the leakage of my own works. I have always been a believer that there could not be more than 5 or 6 per cent. of absolute leakage through the pipes of any company in the streets. I believe that if we exceeded that quantity it would create a great nuisance, and such leakages do not take place except where the company is newly started, and a few of the ends of the mains are left open. I, therefore, set to work to account for the misappropriated gas, and I found upon my own works, taking all the care I could, the quantity of water that I pumped out of the gasholder syphon, when expanded into gas, amounted to 1½ per cent.; that is the quantity of condensed water. I have found that the larger the quantity of gas I made, the higher the temperature at which the gas was measured at the station-meter. That also made me turn my attention to country gas-works as compared with town gas-works, and I have found as a rule that in country gas-works their apparatus may be said to be generally somewhat more capable of condensing a quantity than the large town gas-works. The increase is so rapid that, as a rule, the temperature increases in some measure upon us to a great extent. The condenser was originally formed to reduce the gas to the temperature of the air; but that is, in fact, an impossibility. It may appear to do so, but the gas enters the meter warmer, and must leave it warmer, than the temperature that cools it. As a rule, the gas may leave the condenser 3°, or 4°, or 5° higher; and it also acquires a certain heat in passing through lime or other matters, dependent on the quantity made, and dependent on the exposed surface of the purifier to reduce that temperature. If the exposed surface is very great the whole of the chemical heat might be absorbed during the passage, but as a rule it is not so. The larger the quantity, as a rule, the condensation decreases. In the ordinary circumstances of no excessive or peculiar draught, the effect of the process is to increase something like 8° or 10°, but it is wholly dependent on the size of the apparatus and the exposed surface. In the Great Central there are two or three circumstances that are quite different from what I have seen at any gas-works. In the first place, the condensers are powerful, but, when the gas leaves the condenser, and passes along by the end of the retort-house, there is a flue in the chimney within 5 feet of it. It would appear at first sight that it is not near enough to warm it, yet the whole of these flues are lying in water. There is no perfect drainage in the works, and I have found the water conduct the heat from the flue to the pipe, and thereby heating it. The pipe then passes very near to the flue of the boilers, and I have no hesitation in saying it thus receives an additional quantity of heat. It then passes into the exhauster, and there a portion of latent heat is developed, and that again raises the temperature. As a rule, in other works there would be no elevation of temperature from the time of passing from the condenser to the purifier. The elevation of temperature at the Great Central Works varies according to circumstances, but I think it does not rise less than 10° or 12° in its passage before it enters the purifier. Taking an average state of things, and excluding the contingency of a strong draught of cool air that might be experienced at times, it is somewhat a complicated question as to what would be the normal effect of the passage through the purifier on the increase of the temperature. It depends, in the first place, upon this—if the gas enters the purifier at a considerably higher temperature than the air, the radiating surface of the purifier has a considerable action in reducing the temperature, and that may be as much as the actual heat while the gas is passing through the purifier. On several occasions I have found the gas come out of the purifiers as it entered; on one or two occasions 2° less, and on some other occasions 8° or 10° higher; that is dependent on the state of the surrounding air, and whether the one will balance the chemical heat or whether it will not. As a rule, I should attribute 5° or 6° to the increase of temperature. I think the radiating surface of the purifier is very considerable, and I do not think the chemical action would amount to more that 5° or 6°, considering also it would always enter at a higher temperature. You quite understand if gas enters a cold vessel at a high temperature, and higher than the temperature of the air, if the vessel exercises a cooling influence it may be equal to the chemical heat. It might be less if there was a draught, and was less on one or two occasions.

By Mr. ARCHIBALD: Whether the gas would leave the purifier at the Great Central at the same temperature, depends on the temperature at which it enters. If you will be kind enough to take my estimate this way, that I believe the gas will enter the purifier 10° or 12° higher than it leaves the condenser, and it will probably leave the purifier about the same temperature, on account of having been at a high temperature on entering.

By Mr. LLOYD: I have seen the diagrams which you have, and I know them to be correct. [Witness, at the request of the Umpire, described the way the pipe passes after leaving the purifier.] This drawing only refers to the point from the purifier to the meter, and not to the circuit which the pipe has taken along the boiler flue. If this pipe from the purifier had passed through the air, it is very likely the temperature would have been reduced. The length of the pipe would be sufficient to reduce it, but instead of doing so it comes out of the corner of the building, and passes under the earth [describing on the diagram] and through the retort-house. It acquires a very large and sensible portion of heat in passing through between the hot flues during the time that those hot flues may happen to be in operation. The fact is, that the rise of temperature I have found vary from 10° to 11°. On one occasion it was 16°. It is impossible for me to say whether those flues are always in operation.

By Mr. BARLOW: I have found it as low as 10°, and I will explain how that was. It was necessary for me to verify the fact whether the pipe did pass, and I had it stripped, when there was immediately a sensible diminution of the thermometer at the station-meter, on account of the letting in cold air. We filled in the ground on Saturday night last after Mr. Hawksley viewed it, and I do not suppose the ground has got up to its proper temperature, because of having let the air in. I saw the water running as I stood in the trench, which is a very extraordinary circumstance. The works are peculiar; the flues are at the bottom of the lowest bed, the earth is not well drained, and when you first light a fire you are obliged to evaporate a large portion of water out of the flue. The observations which I made, and which showed an increase in the temperature, were taken at the time the flues were in action. If the retorts with which they are connected were out of use, the flues would not be in action, and there would be no heat communicated; but, unless the whole of the west of the wing were out, and probably unless a portion of the other wing were out, this hot pipe would communicate it. During the summer there might be times when this effect would not be going on. As to the hot gas-pipes, that, I think, would be continuous. I took the temperature of the gas as it entered the inlet of the meter several times, and the results were generally 20° above the temperature of the atmosphere, which I think, when the whole apparatus was at work, would be a fair estimate. I have found it at 80° when the atmosphere was only 55°. It is usual for gas men to consider gas is at a standard volume when at 60° Fahrenheit and 30 in. barometer. Now, if it were measured at 80°, instead of 60°, it would then be of course 20° above

the standard bulk, inasmuch as I believe in passing through the earth the whole of the pipes would act as an enormous condenser. The quantities passing along them are reduced to the average temperature of the earth, which I have frequently proved when investigating these matters to average about 55°. My opinion is that gas is measured at about 55° temperature in London at the consumer's meter; therefore, in making my calculations for consumption I have put it at 5° below standard-point as the real point to ascertain the true quantity measured. Supposing the gas, as it enters the station-meter, to be 20° above the normal condition, the effect would be 25° difference between the point of measurement at the works and the consumer's meter, which would amount to a little more than 5 per cent. in volume; but, inasmuch as gas has a tendency to deposit a water vapour, and that is pretty nearly 1 per cent. for every 15° or 16°, it would be 6 or 6½ per cent. in the volume, supposing the gas to be fully charged with water vapour and other vapours at the time. My own experience will show, as I said before, that gas is still more liable to deposit moisture than the ordinary experiments of Dalton and Reynolds, and others, indicate. My impression is, it would be 6½ from one meter to the other, and probably 5 per cent. difference from the standard. I do not say that that per centage is to be reckoned on in the transit of the gas in this case. I said that I never would predict what the amount would be, unless the circumstances were well known.

Mr. ARCHIBALD: From the data you have, can you at all account for the quantity of unaccounted-for gas which appears on the tabular statements that have been handed in, and will you give us your idea on the subject?

Witness: In the first place, it is new and startling to me to suppose that the leakage of gas, or the misappropriated quantity, has been reduced to so perfect a calculation, that anything beyond a certain definite amount can be said to be more than the true amount. I have never heard of any gas company that started with the position that a certain portion is the proper and definite leakage, and all beyond is excess. I have examined many gas-works, and know the leakage. As a rule, the leakage of country gas-works is less than that of London. Of course it is wholly speculative as to what that difference arises from; my own experience is that it arises from this: partly, I think, from the temperature of the gas, generally speaking, being near the temperature of the air when manufactured; partly from the fact that when the pipes are laid, they are laid in ground that is very seldom disturbed, and there is no heavy traffic or breakage of mains; and partly owing to a more perfect supervision. In my own works I have prided myself on having a very small leakage, averaging from about 15 to 19 per cent. I have not found that as I increased my quantity, that that per centage had decreased on the quantity. My last half year was 19 per cent., the highest that I had. Our mains were very similar to the mains of the Great Central, and were laid about the same time. The leakage has not decreased either in per centage or fact. Our rental has increased from £15,000 to £44,000 a year from that time, and our quantity supplied must have increased in a similar ratio; and, notwithstanding that, our leakage has not increased.

By Mr. BARLOW: Our length of pipes is exactly 60 miles. The average diameter I cannot tell; I have not gone into that. Our largest pipe is 24 inches. We have a 24 and 18 leading mains from Kensal Green to Piccadilly; and, in fact, we are very similar to the Central in our general circumstances, inasmuch as we have four miles of leading mains before we give a supply. Our rental is £44,000. I scarcely remember the total quantity of gas, but will give it you on Saturday. We charge a little under 5s. per 1000, on the average. I do not think our consumption of coal has reached 20,000 tons.

By Mr. LLOYD: Within the last seven years we have risen from £15,000 to £44,000. It has been gradually and progressively increasing. We have one district which is particularly rich—St. James's; it is a richer district than the City. We have there 11 miles of main, and a rental of £14,000. In reference to the leakage in the Great Central mains, I can only state my experience as an engineer, that it is impossible to take a definite quantity of leakage upon a definite quantity of rental, and to assume that that is sufficient for any amount of rental. Of course you will see many matters will interfere with it; first of all, there is the 6 per cent. to be taken off for condensation, or 3, or whatever it is. If you go into the calculation, you will at once see those are constant deductions from the original amount. Then there is the fact of the meters registering a little less than they should do; then there is the increase of consumers and the extension of the mileage. The temperature, as the works increased, would be a rising quantity. In the smaller quantity, condensation is more perfect, and in my allowance of 18 per cent. I have not been alarmed at it; it is more than it should be, and, if I make that deduction, my leakage would come very similar to what it was before. Taking the quantity manufactured in the normal year, and comparing it with the last, I should say that the smaller quantity would come to the station-meter at a lower temperature. There were circumstances which might occasion an increase in the leakage after the first year. The only thing that is constant here is the length of mains; but that is interfered with by the heavy traffic in the City of London. Putting that, however, against the smaller mileage, one would go as far as the other. There is no doubt that every service-pipe that is added will cause a certain amount of leakage. Another circumstance is the dislocation and disturbance of the pipes in the construction and repair of sewers. The contractors are not responsible for what they do; they pass a long sewer, and they are careless in shoring up our pipes. They sometimes break, or they fall into a different position and become very much dislocated. We have had many cases of that kind. There have been a large number of sewers constructed in the City of London, and every sewer that is constructed has had its effect upon the mains. It is my rule, on going into my balance-sheet at the end of the year, to add anything which I know is burnt or used at the works. I do not call it misappropriated. I reduce the quantity of misappropriated gas by that which I cannot account for. We can ascertain the quantity consumed there, and I think that the works have no right to charge as leakage that which is actually burnt. I know several works in which meters are put for their special consumption. It is very difficult to account for the difference between the leakage of the normal year and the present. The column of 8,000,000 unappropriated looks very great, but to a gas man who is accustomed to look at things as they should be, there is nothing at all special in the amount. I should not say it was an extraordinary amount. I think the average is about 17½ leakage; I can only say I should like somebody to guarantee me against any excess in that state of circumstances. I believe without saving something by the public lamps he would not have done it at that. I will tell you exactly how I do it, if it should happen that on any special night I have less gas to supply my consumers with. I have a certain number of customers who are private, and a certain number of public burners, and my business is to hold the key of the public burners in my hand. The lamplighter goes out; he has no discretion; he lights the lamps according to the pressure. Probably there would not be time for me when I am in difficulties to say to my lamplighter, hold in your lamps to-night; but by that means I can hold them at any point I choose. If I have enough gas, I allow the pressure to go on. I know when I restrict them, but I do not restrict the others. I observed by Mr. Croll's pressure-sheet that was often done; I do not know whether by ignorance or not. I have compared the pressure-papers. I have found sometimes the system has been practised pretty generally for a year together. Towards the year 1857 it does not seem to have been so well carried out. I have found that the additional pressure put on for the markets in the morning has risen up to, and in some instances exceeded, the original pressure, but they are very few. Whether the one balances the other would appear from the pressure-paper. I apprehend the practice in these cases is, if the lamplighters were instructed to light at 5 feet, probably two hours after it would go down to 4 feet, and it would travel in that way to three or four o'clock in the morning, when the pressure has been put up to about half as high again as that originally ordered; but supposing it to go up to 15-10ths, which was ordered, it would never burn 5 feet per hour at the time of extinguishing. Taking the whole night through, judging from the statements that have been given, it would not average that. I have seen the state of the works; they were altogether in a very bad state. Nearly the whole of the pipes were stopped up. The state of the works would, in my judgment, account for a diminished quantity of gas produced per ton of coals.

Cross-examined by Mr. ARCHIBALD: I do not know at what point the public lamps were lighted. If they were lighted when the pressure was up the effect would be that they would burn less when the pressure went down—the average of the whole would be less.

By Mr. LLOYD: With a pressure of 12-10ths at Aldgate it would depend upon the quantity of gas passing what pressure would be required at Bow. Taking the actual supply, it is very difficult indeed to give a statement upon that. The pipe at Bow was not supplied by a pipe of sufficient diameter to enable it to be duly charged, therefore there was something like 6-10ths lost on the works. One night I tried the experiment, but having lost 6-10ths there by simple friction from the gasholder to the point of delivery, it was impossible for me to continue it. There is a 26-inch main that leads from the works to Aldgate, and there is a 3-feet main which starts independently and joins into the 26-inch main at something like a mile up the road. With these two pipes in action, and both fully charged from the works so as to give 46-10ths of the supply at the gasholder, there is no doubt you should have two inches pressure at Aldgate. Under these circumstances, when about 180,000 feet per hour are passing through them, we get something like 14-10ths at Aldgate for the 46-10ths at the works. The loss of 6-10ths that I spoke of is due to the arrangement of the pipes at the works, from the gasholder to the main. In the 26-inch main you can only get 33-10ths, and that can be proved. When I found we lost 6-10ths, I immediately set to work to see if there was anything in the pipes; and when the ground was opened, it was found to be a 14-inch main.

By Mr. MAY: Through a 14-inch main the 26-inch main was supplied.

Mr. CROLL: Yes, and a superabundance going to the governor. I never had any difficulty in obtaining the pressure there, and I say that these mains are amply sufficient to convey any pressure that is required at that particular point.

Mr. MAY: Am I to understand that a 14-inch main is expected to pass all the gas that is to be conveyed 2½ miles by a 26-inch main?

Mr. CROLL: Yes; all the gas that is necessary. It depends on the short distance you have to pass the gas through the 14-inch main. We never had any difficulty in passing the whole with a tenth loss of pressure.

Witness: I do not agree with that. The fact is, we lost 6-10ths, and you know as you increase that quantity the difference would become still more.

Mr. CROLL: I say that 180,000 feet per hour can be obtained from these gasholders and the supply main. This is an arrangement made for the purpose of saving expense in the original construction of the works, and I say you can obtain within a tenth and a half, at the very utmost pressure you have in the gasholder for the supply of 180,000 feet per hour. Mr. Wright has now spoken of two mains, and not of one.

Witness: I will state roughly that with all the pressure we can put on at the works it ranges from 15 to 14-10ths at Aldgate.

Mr. ARCHIBALD: As to the public lamps, Mr. Croll instructs me to say that they were not lit in the manner described.

Mr. CROLL: It is not a fact that the pressure was put on for the time at which they were lighted, and for the purpose of lessening the quantity as the morning approached.

The UMPIRE: Mr. Wright did not say anything of the sort; he only described what he would do when necessary, and left us to draw the conclusion that you had done the same.

Mr. ARCHIBALD: He said there were indications in the pressure-paper from which he drew the inference. Was anything of that kind done?

Mr. CROLL: Certainly not.

Witness: When a lamplighter goes out, he lights the gas according to the pressure that is on, and is instructed to turn the light down to a particular point. I have prepared a large number of these sheets, and have drawn the line through them from sunset; after that time a gradual fall takes place, and subsequently a further fall. Now, if the burners were lighted at that pressure, and the tap shut off to regulate them, they would burn less per hour later at night. If the pressure did not rise at any time beyond that point, it is physically impossible it could burn a larger quantity than the initial quantity indicated.

Mr. MAY: That depends upon whether they were lighted to burn 5 feet at a high pressure, and also whether these are true records of the pressure.

Mr. BARLOW: There is another element in it—the pressure-papers at the works. These should be taken in connexion, because the whole of the eastern side of London is supplied direct from the works, and the supply is taken off before it gets to Coleman Street, where the pressures are taken

Cross-examination resumed: The construction of sewers is never constant; mileage is; traffic is not—it varies in town and country. In the City, throughout which these mains are laid, the influence of the traffic would, on an average, be pretty much the same from 1851 to 1857, and the mileage also; but the mains, from the shaking, would be getting worse until a rupture took place and a permanent repair was necessary. With the traffic and the sewers together, I have not the slightest doubt that there would be, in five or six years, an amount of damage to the mains which, notwithstanding the increased consumption and the increased diligence in discovering escapes, would make the leakage come to about the same point as it started at. The leakages which are produced by traffic are not from sudden ruptures of pipes, but from the gradual shaking of the joints and service-pipes and connexions. With regard to the temperature, as I stated before, a slight increase would be due to the manufacture of a larger quantity of gas in the same apparatus, and also to the times at which the special beds of retorts were lighted. The first time that I took the temperature at the works was a fortnight ago. I have had no experience beyond that time, my attention being directed to other and more important matters there. As-

suming that the station-meter is correct, and the return from the consumers' meters correct also, the difference between the two correctly represents the whole amount of leakage, including compensation and every other source of loss. I do not apprehend that the quantity of unaccounted-for gas, shown in the first year, would be a sufficient quantity to allow on the same production in a subsequent year; because, whether in the City of London or elsewhere, there is the effect of the traffic of the intervening period to be added. There are also other disturbing causes: generally speaking, there are a number of consumers leaving the company, or being taken on, so that the mains are being constantly drilled with fresh holes, or the old ones plugged up. Something, too, must be allowed for the deterioration of consumers' meters. I think these causes would increase the absolute quantity of unaccounted-for gas. After seven or eight years, gas-pipes will get into something like a normal state. Up to that time there is so much repair going on, as dilapidations take place. [Plan of retorts produced.] The chimney has been connected with eight of these retorts; at the present moment it is drawing the whole of that side. We managed to make a separation between the two, which did not exist before, and my experiment has been made since that separation, and probably a portion was going up a different chimney. The heat in this passage would not be much greater. There would be a greater volume passing there, but not at a higher temperature. The temperature of the flues in the retort-house is the temperature of making the gas. We should have twice the volume passing through that flue at the same time, at about the same heat.

By Mr. BARLOW: The tendency of the larger volume would be to increase the temperature slightly. We had four beds which were constant, and also three others, a portion of which were taken up to a temporary flue. The heat in that pipe is as 7 is to 10—that is a question of volume. In the other case, the heat is not raised at all, and therefore it would not be in that proportion. Inasmuch as the contractor is now carrying out his own plans, I do not very materially interfere with his operations. I do not know that he has ever used tar there. I have not been frequently at the works since this arbitration; I was before. There is a flame some 8 or 10 feet above one of the chimneys; I have not observed it at the others. There is one set of purifiers in use at the present time. We were compelled to break the connexion, as there was not a valve in the place that would shut. The effect of using a greater number of purifiers on the temperature of the gas would be to cool it. I do not think they could all have been in use before we took to the works. It was impossible to use one set when we went there; when we attempted it we found the lime had concreted to the bottom of it, and it was necessary to chip it with a crowbar. It ought not to have been allowed to collect until it stopped the progress of the regulating arms.

By the UMPIRE: That I saw. We had difficulties in manufacturing the gas during the time we did it. The purifiers might have been a considerable time in that state—probably three or six months.

By Mr. ARCHIBALD: I do not think it would affect the result of my observations materially using only these three purifiers, as when I made them we were only making 1,000,000 per day; and, certainly, this winter we shall have to make 2,000,000. I think it was a fair mode of ascertaining the temperature in Mr. Croll's time. Of course it was impossible for me to tell when these particular settings were lighted. I have had the temperature of the outlet of the meter taken, and I think the difference between the inlet and the outlet was 8°. I went over the Commercial Company's works once. I am not aware the main passes through the retort-house there; if it does, it is not a normal state of things. The object of the condenser is to cool the gas, and if you heat it afterwards it is not what I would call proper engineering. The observations which I made showed that it was about 20° above the temperature of the atmosphere; that is what the meter stands at. I have seen it somewhat higher, and I have seen it lower; that I am quite positive of. I think that would be independent of the time of year. If the air was heated, the condenser could only bring it down to 80°; if it still passed into the purifier, there would be something like 10° of heat added there. Passing through this hot flue would in summer elevate the temperature to what I stated, above the temperature of the air. The number of settings was 14 at the time I made the experiments, as we had eight then under repair. We were making 44,000 feet per hour. [Witness described the position of the settings then at work.] There is an outside wall between the flue of and passage. The pipe passes along on the outside of the wall; a boiler is now erected there, and the flue passes through there. I attributed the principal heat to that; I also attribute a certain portion to the latent heat given out by the compression from the exhauster. It would not affect it whether covered with clay or with water. I have found the water-level occasionally up in the station-meter, as most engineers find, from the carelessness of the servants running more water in than the pipe will take, which is a thing that might make a difference. We have an overflow-pipe and glass round it to see when it is right and when wrong. I have tested the inlet of the meter recently; it is something like 75°; it used to be much less.

By Mr. BARLOW: In the Western Company the whole of my sixty miles of mains are not new; we have eleven miles of mains in St. James's that are absolutely new. We have about fourteen in the Grosvenor district which are absolutely new. There are nearly eleven miles of leading main which are new, and the rest are all new except a small portion that we bought from the Brentford Company of old pipes. We have the Kensington district now, but that has been so recent that it forms no part of my experience. We have bought from the Imperial, and also from the London Company. I think the old pipe will not exceed from twelve to fifteen miles out of the whole quantity.

Re-examined by Mr. LLOYD: It is difficult to say what effect the difference of 8° between the temperature at the inlet and the temperature at the outlet would have on the quantity of gas registered. At first the cooling influence of the house would be principally exerted on the sheet-iron meter-roof, and it would have a tendency to cool the gas after it has been measured; on the contrary, if it is due also to the heat of the water, which exposes the surface of the measuring gas, in that case it would have its effect on the gas previous to measuring. It would not be the whole 8°; it is more likely to be less than greater. A mean of 4° would be ample, because the gas is passing rapidly into the chamber, and its heat, if wholly acquired from the water, would be apparently acquired as much in passing out of the chamber. Supposing there were 10° of heat, I suppose 4° would be due to the inlet, and 6° to the outlet. My general opinion is this, that it is a perfect fallacy to attempt to reduce the unaccounted-for gas to a standard. My assumption is that the Great Central have to congratulate themselves on having so little loss, and I hope it will always continue at the same average as last year.

By Mr. ARCHIBALD: I have not been appointed engineer; the directors simply asked me to attend to their matters, and I am doing so.

By the UMPIRE: It is impossible to show what are the corrodings. There is a cast-iron circular body about four or five feet deep, in which is put milk of lime; the gas passes into it, and the material is changed into a chalk or a carbonate of lime. That chalk has a tendency to form a deposit or a concrete at the bottom, something like limestone. The part which is corroded is six inches; and there is a radial arm, and that is left with the deposit upon it, so that sometimes the arm may be broken on account of the hard deposit. The arm was generally broken. There is not a question as to the state of the works: the state was frightful. I was not at the works on the 25th of July; my engagement has been more recent. I think the company engaged Mr. Hawksley and Mr. Anderson to go there then. It was the middle of August when I first went.

By Mr. ARCHIBALD: I have no specific engagement; the directors sent for me, and asked me to endeavour to save them in the winter. They were rather in an awkward state, the works being in such a bad condition; and I undertook, if they put proper means at my disposal, I would do my best to save their customers during the winter; but I have no special engagement with the company; it is a question that has not been settled. If they choose to make me an offer, that is a question for them; but at present I have no terms with them.

(To be continued.)

Miscellaneous News.

ORIENTAL GAS COMPANY (LIMITED).

The Fifth Annual Meeting of this Company was held at the London Tavern, on Wednesday, the 26th ult.—Captain BARBER in the chair.

After the usual preliminaries, the SECRETARY (Mr. Baddeley) read the following report of the directors:—

In accordance with the provisions of the company's Deed of Settlement, the directors have now to submit to you their report upon the existing state of the company's affairs.

In approaching this subject, the directors acknowledge with pleasure the patient endurance of the shareholders, called for by inevitable delays in carrying out this undertaking far beyond any approximate estimate that could have been made at its advent; and, that the shareholders may be satisfied the causes which have occasioned these delays have been wholly uncontrollable, they place before you a brief historical record of facts.

This company was formed in the month of April, 1853, for the purpose of introducing the use of gas into British India, and was completely registered, in order that the strongest evidence might be given of a *bonâ fide* intention, as well as capability, of carrying out the undertaking in the event of certain privileges being granted by the East India Company, under whose patronage your directors desired to confer so vast a benefit, by the aid of British capital, on the inhabitants of Calcutta.

Negotiations were thereupon entered into with the East India Company, the Government of Bengal, and the Conservancy Commissioners of Calcutta, which resulted in the local authorities inviting "Tenders for Gas" from the public generally; and it was not until the month of July, 1854, that your directors received in London from the secretary to the commissioners an acceptance of the terms of this company's tender. Thus more than a year passed without any conclusive arrangement being made whereby the directors would have been justified in resorting to practical operations.

It may be supposed that, as soon as the contract was confirmed, the lighting of Calcutta with gas might have been easily and rapidly accomplished; but your directors, although duly impressed with the necessity of rendering your capital productive by the earliest possible employment of it, felt that to make a false step on the threshold of the undertaking would be to compromise their characters as men of business, and accordingly determined not to enter into contracts for machinery and material until the engineer-in-chief could aid them by his counsel and direct them by his experience.

The time having now arrived for completing a definite engagement with a well-qualified engineer-in-chief, Mr. Danré, a gas engineer of first-rate qualifications, who had just completed the construction of works to light Stockholm with gas, agreed with this company to undertake the responsibilities attaching to the construction of works distant many thousand miles from England, and subject to natural and physical difficulties.

Mr. Danré entered your service in October, 1854. The Conservancy Commissioners' plans and proposals were placed before him, and he produced his requirements, estimates, and specifications, accompanied by drawings, which were approved by Mr. George Lowe, your consulting engineer.

Mr. Danré as chief, and Mr. Cowan as sub-engineer, on their arrival at Calcutta, surveyed the ground, and advised the board in February, 1855, what plan of operations should be adopted on the first introduction of gas into India.

Two years having elapsed since the formation of the company, your directors immediately gave effect to the recommendations of their engineer, and sent out workmen, and, in quick succession, shipments of machinery.

During that year, however, the *Lightfoot* and the *Dream*, two vessels containing large quantities of important machinery, were totally wrecked near their port of delivery in India, which occasioned much delay and inconvenience in the progress of the works.

Nor was the loss of material the only misfortune which, at this time, befel the company. The company had also to sustain a serious loss through the death of the engineer-in-chief. The state of Mr. Danré's health had previously engaged the board's attention, and they promptly secured the services of Mr. Wilton as a practical gas manager, well able to co-operate with Mr. Cowan in maturing the late Mr. Danré's plan.

In the month of March, 1856, Mr. Cowan, then acting engineer (since dead), was compelled, through ill health, to return to England by the same steamer which brought intelligence of the fact, and Mr. Wilton was left in charge of the current work.

On the 16th of May, 1856, Dr. O'Shaughnessy advised the immediate departure of Mr. Wilton from Calcutta, in consequence of an illness which had so affected his health that he was not likely again to be a useful servant to the company in India; and Mr. Wilton returned to England accordingly.

No time was lost in despatching their successors (Mr. Billows and Mr. How), who duly arrived in Calcutta in September, 1856. Mr. How died in the early part of the following year, when Mr. Durkin was appointed to the vacant situation.

These contingencies have tended very considerably to augment the labours and anxiety of those to whom you have been pleased to entrust your interests; for even Mr. Billows was not spared to effect the lighting of Calcutta with gas. The managing director wrote, under date Calcutta, July 4, 1857:—

"It is with deep regret I have again to report continued misfortune. Mr. Billows died yesterday morning of cholera, after seven hours' illness. The day before he was at this office until five o'clock, taking my final instructions about lighting up the following evening; he was perfectly well, I hear from the assistants, up to twelve o'clock, when he went to bed, and at eight yesterday morning he was dead. We buried him close to poor Danré in the evening. This continued mortality amongst our engineers is frightful."

The next letter from the managing director in Calcutta announced in these terms the first introduction of gas into Calcutta:—

"*Calcutta, July* 20, 1857.

"I have much pleasure in commencing this letter by informing your board that Calcutta at last is lighted with gas. It is about four years since the project was first started in London; the delays and tedious correspondence we have had with the authorities, the terrible misfortunes we have had to contend against in the successive deaths of three chief engineers and one principal assistant, and the distance we have had to bring every article required in our works, with the losses sustained at starting by shipwreck, will show our shareholders the difficulties which have beset us.

"On Monday, the 6th inst., we lighted all the public lamps from Bow Bazaar, along Cossitollah, Chowringhee Road, to the corner of Harrington Street—in all 55 (all lamp-posts). The success was complete—not one *contretemps* of any kind—and we have had them lighted steadily every night since, and they now are lighted as regu-

larly and with as little fuss as if Calcutta had been lighted with gas for twenty years, barring always the wonderment and excitement of the natives; for the first week the crowds which paraded the lighted streets were immense, and their conjectures as to the cause of the light were amusing. Even now crowds assemble every evening at each end, and run along the line with the lamplighter, setting up a shout of astonishment as he applies his lantern to the burner. The commissioners are highly pleased, as are also Lord Canning and Mr. Halliday. My own house, Prosono Coomar's house, Bodry's Hotel, F. W. Browne's are already lighted, and my servants are perfectly *au fait* at the gas lighting. Prosono had about 10,000 people in his house for the first two or three nights gazing at the brilliancy of his lights with astonishment."

Your directors are at length able to congratulate you that the great object for which this company was formed has been successfully attained, namely, the lighting of Calcutta with gas.

The shareholders will remember that during the delays and misfortunes above referred to their unconverted capital was not unproductive, but was laid out with much prudence to such advantage that the accumulation of interest, when divided by a resolution of the last general meeting, yielded a payment of 7½ per cent. upon the paid-up shares of the company.

At the date of the last advices from Calcutta gas lighting had made a steady progress, notwithstanding the mutiny, which has affected everything connected with India. The development of a gas business, especially in a new country, is not the work of a day, but requires a practical education of the people among whom it is introduced to the uses, conveniences, and economy of that light-giving agency.

The following statement will show the progress during each month from commencement:—

	Public Lights.	Private Lights.
1857—July	80	253
August	94	418
September	94	494
October	142	555
November	146	629
December	191	667
1858—January	247	714
February	299	741

BALANCE-SHEET, TO DECEMBER, 1857.

Dr.

To 50,000 shares of £1 each			£50,000	0 0
50,000 new shares, upon which a deposit of 2s. per share has been paid		£5,000 0 0		
49,670 new shares, upon which the 2nd and 3rd calls of 3s. and 5s. per share have been paid		19,868 0 0		
			24,868	0 0
Interest to December, 1856	£3,709 15 6			
Ditto, balance to December, 1857	333 11 5			
		£4,043 6 11		
Deduct interest on 50,000 shares at 1s. 6d. per share, pursuant to resolution of general meeting, May, 1857	£3,750 0 0			
Less interest on 1135 shares not yet claimed	85 2 6			
		3,664 17 6		
			378	9 5
Contingent-fund			3,268	7 1
			£78,514	16 6

Cr.

By outlay, as per balance-sheet to December, 1856			£55,505	5 11
Ditto, to December 31, 1857—viz., passages of engineers, &c., to India, and travelling expenses	£ 233	13 0		
Machinery, materials, and tools	2,443	8 0		
Pipes and main-laying	1,232	5 10		
Freight and insurance	498	1 9		
Buildings	2,257	16 4		
Salaries and wages in India and London	3,590	11 4		
Directors and auditors' fees	892	0 0		
General expenses	1,362	17 2		
General charges in construction of works at Narculdangah and Soorty Bagaun	1,249	11 7		
Postages, office furniture, advertising, printing, and stationery	305	11 4		
Preliminary expenses	200	0 0		
Exchange and commission	597	8 11		
Coals	1,567	9 4		
Lime	140	17 4		
Meters	750	17 3		
			£17,322	9 2
			£72,827	15 1
Less travelling expenses charged to contingent-fund		£531 19 3		
Transfer fees		24 7 0		
Amount received for gaslight and meters		703 8 1		
			1,259	14 4
			£71,568	0 9
Balance in Calcutta, viz.:—				
Cash	£ 621	6 1		
Bills receivable	1,920	0 0		
		£2,541	6 1	
Deposit account	£6,000	0 0		
Current ditto	905	9 8		
	£6,905	9 8		
Less bills payable	2,500	0 0		
		4,405	9 8	
			6,946	15 9
			£78,514	16 6

Upon the death of Mr. Billows, the management of your works temporarily devolved upon Mr. Durkin, who had been sent out as assistant in the place of the late Mr. How. The chief appointment is now held by Mr. George Clark, whose selection has been made with the greatest possible care. His testimonials are of the highest order, and are based upon a well-gained experience in the service of the Imperial Gas Company, London.

It should be stated that since the formation of the company the shareholders have availed themselves of the law of limited liability, and that powers similar to those ceded to gas companies in England have been conferred upon this company by an Act of the Legislative Council in India.

The balance-sheet presents a statement of cash receipts and payments in London and Calcutta up to the 31st of December last. Up to that date, it may be said, the works were in operation on little more than an experimental scale, it being desirable at the very earliest moment to demonstrate to the Calcutta community how great a boon had been conferred on them by the introduction of gas. The directors, therefore, in framing the balance-sheet, have carried the cost of coal, lime, meters, &c., to outlay, and have credited outlay with the amount received for gas, meters, and transfer-fees during the same period. The current year will, of course, commence with stocks in hand, and will form part of the profit and loss account which will be presented to you next year. The directors, not being in a position to declare a dividend, direct your attention to "Interest" and "Contingent-Fund." These items would provide a payment after the rate of £4 per cent.; but the directors leave the matter in the hands of the shareholders, to be dealt with by them as they shall by resolution determine.

The directors have the pleasing duty to record and acknowledge the eminent services rendered to the company by William Anderson, Esq., the managing director in Calcutta, of whose zeal, tact, and judgment they cannot speak too highly.

The retiring directors upon this occasion are, Joseph Brown, George Denny, and Charles Farquharson, Esquires, and the retiring auditors are James Sydney Stopford and Henry McLauchlan Backler, Esquires, who, being eligible for re-election, offer themselves accordingly.

In conclusion, your directors beg to state that their confidence in the ultimate success of the project remains unabated, and that their hopes are as sanguine now as they were at the outset of the undertaking.

The annexed balance-sheet was taken as read:—

The CHAIRMAN, in moving the adoption of the report and accounts, said the report was very full, if it was not very satisfactory. The directors had told the shareholders all the circumstances at present and all the circumstances that had passed, and he did not know that the report needed any comment from him, or any amplification to take up their valuable time. He thought it would be admitted by every gentleman present, as well as by every shareholder absent, that no project had ever been visited with such misfortunes, altogether beyond human control, as had been the lighting of Calcutta with gas. There was one circumstance, in the last paragraph but one of the report, which perhaps required a little amplification. The directors had there stated that up to the 31st December last the works were in operation on little more than an experimental scale, it being desirable at the very earliest moment to demonstrate to the Calcutta community how great a boon had been conferred upon them by the introduction of gas. It would appear very clear to them that if the directors had undertaken gas lighting in any isolated parish in this country, where they had all the means and appliances ready at command, they would not have commenced the actual lighting except at a fair and reasonable profit; that is to say, they would not have commenced with the partial lighting of the parish, but would have waited till the works were fully perfected, and they were able to bring the whole into complete operation. But it had not been considered advisable to do so in the case of Calcutta, or they would not have had any gas alight there at the present day. The prejudices of the natives against the introduction of gas were very great and difficult to dissipate; and, in commencing the system, they could not do it by telegraph or by magic, but they had to educate the people for the reception of gas, and this consideration had guided the directors in the *modus operandi* they had pursued. There was another point to which he wished to allude. In the same paragraph of the report the directors said that, not being in a position to declare a dividend, they directed the attention of the shareholders to the interest and contingent-fund. These items would provide a payment after the rate of 4 per cent.; but the directors left the matter in the hands of the shareholders, to be dealt with by them as they shall by resolution determine. The directors had taken this matter into their consideration, and, having thought over it a great deal, there appeared to be two ways of appropriating the fund. The first was for the shareholders to divide it among themselves, not as dividend, because no dividend had as yet accrued from the works themselves—but it was money which might legitimately come into their hands, inasmuch as it was the balance of the insurance upon the lives of those gentlemen who had unfortunately died in the company's service in Calcutta. If those gentlemen had lived, in all probability Calcutta would have been lighted with gas twelve or eighteen months ago, and the proprietors would now be dividing profits which, as it was, they had not been enabled to make. The other mode of applying the money was this:—They could not add it to capital, but they could write it off the construction of works—that is to say, they could reduce the outlay by that amount. But this, as he had already said, was a matter entirely in the hands of the shareholders. The directors had stated the matter as it occurred to their minds very candidly, and they had nothing further to add upon the subject. He would only, therefore, remark that, having moved the report, he would be happy to answer any question which might be put to him thereon.

Mr. HAMMACK seconded the motion.

Colonel ANDERSON said he considered the placing of the report before the shareholders previous to the meeting a great step in advance, as it enabled those who were not present to make themselves fully acquainted with the affairs of the company; and those who attended, being in possession of all the facts, were able to take a more intelligent part in the proceedings. Having had some experience in Calcutta, he fully agreed with what the chairman had said as to the prejudices that were to be overcome in introducing gas lighting into that city. It was a work of great magnitude to undertake it. He had had a personal knowledge of the late Mr. Danré, and a more intelligent man, and one more calculated to carry out the ends of the company, could not have been found. He devoted himself entirely to the task, and had accomplished a great deal. They were apt to look for too great results in that country which were not expected by those who were acquainted with India. He was convinced that India was a country well calculated to be lighted by gas, and he believed in time they would reap great benefits from the project. In a hot country, where every door was kept open, gas was an admirable way of lighting houses; and he believed that, if they progressed steadily, they would ultimately reap the reward of their outlay. He had a few questions to propose, to which he would be glad of the chairman's answers. He begged, in the first place, to inquire what the nature of the auditing of the accounts was—was it a rational audit, or a mere inspection of the figures as they stand in the accounts? He intended to cast no reflections, but he thought it his duty to ask whether it was a rational audit or a mere nominal audit? By a rational audit he meant an inquiry into quantity and prices. Was it a rational audit, or a mere additive audit? He had not a word of objection to offer to the accounts, and *did* not object to a single figure in them, but he liked to know what he was agreeing to. It was too much the way with shareholders to take things for granted,

and then to complain that they knew nothing of the way in which their affairs were conducted.

The CHAIRMAN said, before he answered this inquiry, as it would be more convenient and tend to facilitate business, he should be glad to hear what other questions Colonel Anderson had to propose. He would then go through them *seriatim*.

Colonel ANDERSON said the next question was this:—It appeared to him that the accounts contained a good deal of cross subdivision and more headings than were necessary. What was the difference between "Buildings" account and "General charges in construction of works?" Again, he thought the accounts for the Calcutta and London management should be kept separate; and he would ask what were the respective amounts? He also wished to know the amount of the general charges? He thought, in accounts of this description, a few comprehensive headings should be settled by the shareholders, from which the directors of the company should not be allowed to deviate, as was done with the accounts of the nation. Certain heads of receipt and expenditure were settled by Parliament, and were regularly adopted in the place of a great number of useless subdivisions. He found that they had expended the sum of £71,000 for works. He begged to ask what extent of mains was laid, and to what extent gas was at present supplied for that expenditure? Also, what had been the cost of the manufacturing department in contradistinction to the main-laying and putting on of service pipes? He also wished to be informed, what number of shares were held in Calcutta? These were questions suggested by the report; and he had no other reason in asking them than a desire to look after his own interest. Directors were often left too much to do as they pleased, and then shareholders complained. He would ask such questions as suggested themselves, and then, if he lost his money, he had no right to complain. Having asked these questions, he would take the liberty of suggesting that their £1 shares should be consolidated into £10 or £20 stock, which he thought would be a great convenience; and would further suggest that, both as regarded the directors and the auditors, it was desirable, in the place of re-electing the same gentlemen year after year, there should be an infusion of new blood. He had nothing to say against the gentlemen at present in office, or those going out of office, but adduced it as a principle that it was desirable, from time to time, to have fresh members upon the direction. He would ask, what was the nature of the management in Calcutta? He thought, in an undertaking of this kind, the great thing was to have a good management on the site of their operations; he would suggest a board of management in Calcutta, where the great strain of the work was. All that they wanted in England was a few agents to ship the goods, and some one to receive the dividends that he hoped would accrue. When he was in Calcutta, London was pointed at as an example of good boards and good management; but, as far as his own experience went, he must say that Calcutta boards of management were superior to any thing he had seen in England. They generally paid more attention to business, and, for the most part, held larger stakes in the concern. He thought they ought to have at least three good directors in Calcutta, and the same number in this country. This was a point upon which, from his knowledge of Calcutta and of India generally, he thought himself competent to offer an opinion. He had no doubt, if they went on steadily, they would, in process of time, introduce gas lighting into all the large cities of India; but it was indispensable that it should be done at a very cheap rate, or they would stand no chance of competing with a cheap oil-producing country; and if the gas was not supplied at low rates, the consumption would be very limited.

Mr. ROBARTS asked the directors to take into their consideration the propriety of making a half-yearly instead of an annual report.

The CHAIRMAN having inquired whether other shareholders had questions to propose, said he was happy to have the opportunity of replying to those put by Colonel Anderson. It was very gratifying to hear his verification of what the directors had often alluded to in that room, and to receive his testimony to the skill and energy of the first engineers sent out by the directors to perform the important and difficult duties imposed upon them. He was quite convinced that the loss of Mr. Danré could not be over-estimated, and his death had occasioned the great delay that had taken place. With regard to the auditing of the accounts, he really could not say more than that the selection of the auditors rested entirely with the shareholders themselves; the directors had nothing whatever to do with their appointment. All he could say was, that the requisite conditions mentioned at the commencement of the concern had been carried out, viz., that they should have one gentleman practically acquainted with gas matters and connected with a gas company as one of the auditors, that he might really and truly know what he was doing; and the other, a gentleman of unblemished character, who thoroughly understood accounts and occupied a high mercantile position in the City. These two gentlemen were appointed by the shareholders, and they had occupied nearly a whole day in examining and auditing the accounts; and therefore he believed it was, in every sense, a faithful and explicit one, as it was the wish of the directors it should be. To save them as much as possible, and to take care of the character and reputation of the board, the directors had a gentleman upon their carbonizing committee who spent a great deal of time in an investigation of the monthly accounts received from Calcutta. Those of the shareholders who knew anything about the manufacture of gas would know that the functions of the carbonizing committee were very important and essential ones.

Colonel ANDERSON: What do the auditors understand themselves to have done?

The CHAIRMAN: Their duty is simply to examine the payments, and vouchers for the same.

Colonel ANDERSON: Then it is a mere numerical audit, and I know what I am about.

The CHAIRMAN: It is an audit in exact accordance with the principles laid down by Mr. De Morgan in his able pamphlet on the duty of auditors. They examine the books, and see that what is stated to have been outlaid has been expended, and that nothing has been paid without the authority of the directors.

Colonel ANDERSON: Mark me, sir, I make no reflection; I only wanted to know what I was to understand by it. I now understand it to be a numerical audit.

The CHAIRMAN: I don't understand what you mean by numerical audit. They examine the books, and see that everything has been paid which we say has been paid; and everything expended that we say has been expended; and further, that not a shilling has been expended without the authority of the directors.

Colonel ANDERSON: Then that is what I call a numerical audit in contradistinction to what I call a rational audit.

The CHAIRMAN: If that is your definition, it is so; but we think it is in every way a satisfactory audit, and the appointment of the auditors rests entirely with yourselves.

Colonel ANDERSON: They have nothing to do with prices?

The CHAIRMAN: I submit that it is not the province of auditors to have to do with prices. The auditors will tell you that they have every facility for examining the accounts. They never ask a question but it is answered, or for an account that is not immediately put before them; and the directors are not present when the audit is made.

Mr. HAMMACK: Perhaps you will allow me to state that everything here is done by contract, and the auditors are as competent to form an opinion upon the prices as the directors.

The CHAIRMAN said the next question put by Colonel Anderson was with regard to the two headings of "Buildings" and "Construction of works." In reply, he would say that the works at Narculdangah and Soorty Bagaun were contract works done by Mr. Macintosh; the other was work done by people employed by the company.

Colonel ANDERSON said he presumed that by-and-bye both these would stand as the plant of the company?

The CHAIRMAN said they were the business plant now. Their engineers and officers were living in the houses built for them, instead of paying rent, as formerly was the case. They were all the property of the company, and might be called the plant now. It was thought better to give the fullest information by placing these matters to separate accounts. As to the expenses of the London management and that at Calcutta, the former was £282, and the latter £288. The general expenses, of course, consisted of a variety of items—rent of offices, law charges, stamps on transfers, petty charges, medical attendance in Calcutta and hire of carriages there, which last year was £246. There were also law charges there in connexion with the drawing out of the contract, &c., £361, which would not occur again. In reference to the form of the accounts, he would say that they would be presented very differently next year, when he hoped the directors would be able to give a profit and loss account—in fact, it would be a working account as well as a balance-sheet. The present statement merely exhibited the expenditure in making the plant and getting into work. As to the question what quantity of mains are laid and what supplied, he observed that in the estimate sent home by Mr. Danré for carrying out the D division, which was the first part to be lighted, he gave the quantity of mains as 27 or 28 miles. They were contracted for and sent out, and, to the best of his (the chairman's) belief, about two-thirds of them had been laid.

A PROPRIETOR: But the materials necessary for the laying of the remainder are in Calcutta, I presume?

The CHAIRMAN replied that they were, and they were all paid for, but the expense of completing the laying of them was not yet in charge. Being at so great a distance from the scene of operations, the directors were not prepared with information so definite on these points as under other circumstances they would be. The outlay was £71,568.

Colonel ANDERSON: For that sum how many miles of supply have you completed, and have you the mains there for the remainder of the contract?

The CHAIRMAN replied that the mains were there. They had paid upwards of £15,000 for pipes.

Mr. HAMMACK said the proprietors must not look despondingly upon the position of the company. To take a correct view of this case would be to put it—that if he, on his individual responsibility, had incurred the outlay for these works, and he was about to bring them into the market, what profit should he expect for the accruing advantages of the beneficial contract entered into with the Indian Government? There was one important item not adverted to, and that was, that the sites for their works had been given to them by the Government. He had never known a company which had not had to pay an enormous amount for the sites upon which their works were constructed, but in this instance they had been saved the whole of that heavy cost. He was chairman of another company, which was glad to avail itself at any cost of a proper site for the purpose, and he was now anxiously looking out for a site to extend the works, but he feared he should have very great difficulty in obtaining it. In reference to themselves, they must look at the delay that had been occasioned by the deaths of their engineers. Had those gentlemen been spared, the works would have been in operation so much earlier; but, through the prudence of the directors, from the circumstance of their loss, there was a fund in hand, to which the chairman had directed their attention, so that the one formed, in some degree, a set-off against the other. Had it pleased Providence to spare their lives, Calcutta would have been lighted much earlier, but then there would have been no fund of this kind in hand. He believed that when the labours of the directors were taken into account the shareholders would feel that their interests had been well looked after. He could fearlessly assert that he had never known more valuable time devoted to the service of a company than had been bestowed by the directors on this concern. They had the great advantage of having gentlemen on the board who knew Calcutta equally as well as the gallant colonel. They had a finance committee, by whom every item of expenditure was examined, and everything that could be was tendered for by contract. The construction of the roofs of the works was contracted for at prices which would quite surprise them. He had no hesitation in saying that some egregious mistake was made in the matter by the contractor, but, notwithstanding that, the contract had been most honourably performed. When he considered how much had been accomplished, he could not but congratulate the shareholders upon the great work effected at so low a price.

The CHAIRMAN said, in general terms he might say that the number of shares held in Calcutta was under 1000. As an individual he quite concurred in the propriety of consolidating the shares into £10 or £20 stock, and that matter should have the attentive consideration of the board. Whether it could be done, and how, would require some deliberation. As to the auditors going out, there really could be no objection to that; and, as the appointment rested entirely with the shareholders, they could exercise their discretion in the matter. The objection to retiring directors not being re-elected was this: it should be remembered that, if fresh gentlemen joined the board on such occasions, they would have to be educated, as it were, in gas matters. He might state that, when he was asked to promote the introduction of gas into Calcutta, he reflected that he knew nothing practically about gas, and that, if he were to join in the undertaking, he must have practical men associated with him to supply that deficiency of knowledge. He understood money matters pretty well, and was acquainted with the community of Calcutta, it being now fifty-two years since he was first in India. It was, therefore, one great object, in selecting the board of this company, to get gentlemen who could bring to bear practical knowledge and experience in the matters in which they were to engage, as well as those having a knowledge of India. The system of management in Calcutta had been alluded to, and he was sorry to say he could not endorse the views of Colonel Anderson on that point. Gentlemen were not fond of meeting together in very hot weather, and the plan generally adopted there was to send round a proposition in a tin box to each director, who wrote down his opinions on the back of it. But it was clear that that was not so satisfactory as the discussions which took place in a board-room, where each director had the opportunity of expressing his opinions. Moreover, this company being established under a Deed of Settlement, they must alter that deed before they could alter the system of management that had been laid down.

He thought the shareholders generally would agree that hitherto the management had been satisfactory, and he hoped it would continue so to the end. As far as he was personally concerned—having attained the object of his ambition in having introduced gas into Calcutta—he was perfectly ready to place his seat at the disposal of the shareholders. He confessed to a little ambition on this subject, and, having attained the object, he was ready, if it was their wish, to retire from the board, if they found any one better able to carry on the business. With regard to the issuing of the report half-yearly, he saw no objection to it personally, and it should have the consideration of the board.

Mr. CHAWNER said the next statement of accounts would wear a different appearance to the one now presented; but if it was contemplated, as stated by the chairman, to present the accounts in a different shape on the next occasion, it would be well to establish a good form of accounts in the first instance; for if they began wrong, there was little chance of ever getting them right again. In a concern like this, there should be the heads of preliminary expenses, plant, stock in hand, and so on. That was not the case at present. He suggested, if any remodelling of the form of accounts was contemplated, that they should have the assistance of a competent accountant to arrange the proper heads under which the accounts should be uniformly arranged.

Mr. ALLEN said he would take the opportunity of saying that he had had experience in Calcutta, which was terminated by his removal in 1854. As a member of the finance committee, it had fallen to his lot to examine the expenditure in India, and he was struck with the great increase that had taken place in the price of labour and in the charges for the conveyance of materials to the works. Reference was made to the officers in Calcutta on this subject, and the reply given was, that within the last four years the price of labour had risen 100 per cent. The works at Narculdangah were at a considerable distance from where the goods were landed, and there was a great expense in boat-hire by the canals, in order to get the materials to the works. He could assure Colonel Anderson, that every item of expenditure had undergone the strictest revision of the finance committee, and, in all cases where it was considered necessary to do so, an appeal was made to the officials in Calcutta. In all cases satisfactory replies had been received, except as regarded the cost of labour, being 100 per cent. more than it was a few years since, which was owing to the vast increase of the trade of India, and the extensive railway and other works going on there, without a corresponding increase in the population.

The CHAIRMAN said he might state for the information of Mr. Chawner that the accounts now placed before the proprietors related only to construction. The directors had already consulted an accountant with regard to the form of the accounts, and he had expressed an opinion that more information was given than was necessary; but it was the wish of the board to place the affairs as fully as possible before the shareholders. If gentlemen were not satisfied with the information given, let them come and see him, and he would, if possible, give them more information.

Colonel ANDERSON said he perfectly agreed with what Mr. Allen had said. From very extensive correspondence which he had with Calcutta, he could bear out his remarks, that a great increase had taken place in the cost of labour and every other article. Before they proceeded to the division of the surplus money, he should like to know whether the families of the deceased officers of the company had been considered, or whether there were any parties whom the directors thought were entitled to consideration in dealing with the amount in hand? He would also recommend to the directors that, in sending out men to India, they should select two of pretty nearly similar class, so that if, as had been the case, they had the misfortune to lose one, the other should be ready to step into his shoes.

The CHAIRMAN said the directors had already done so. There had also been gratuities given to the widows of the deceased officers. He was glad the gallant colonel had called attention to the subject, as it gave him the opportunity of stating that an effort was being made to assist the family of one of those officers, and he hoped to receive the votes of proprietors in favour of one of the children of the late Mr. Billows for admission to the London Orphan Asylum at the next election.

Mr. CHAWNER suggested that it would be well to purchase an admission for the child, and not run the risk attendant upon a canvass; though, if the latter were resolved upon, the chairman should have his proxy.

Mr. ROBARTS thought that that was a matter which would be better left to the directors.

The resolution for the adoption of the report was then agreed to.

Mr. CHAWNER moved, "That a payment, after the rate of 4 per cent. per annum, be paid out of the amount standing to the credit of the interest and contingent-fund to the registered holders of old and new (10*s.* paid) shares, on and after the 16th of June next."

Colonel ANDERSON seconded the motion.

Mr. LAMBERT said he rose for the purpose of opposing the resolution. The notorious thirst for dividends that shareholders always possessed was at the root of a great deal of the mismanagement of public companies, and led to the "making things pleasant" which had been so fearful a source of ruin. He contended that in the present case the money had not been earned by the Oriental Gas Company in a manner to justify them in dividing it. He was as fond of receiving dividends as any one, but he could not consent to an arrangement of this sort while they had actually at this moment a considerable portion of capital not called up. His recommendation was, that it should either go against calls or, what was the same thing, be written off the construction account. Had the gentlemen whose lives were assured not have died, the works would, in all probability, have cost the company less; they would have been better done, and the company would have been spared a large outlay in the shape of interest. The construction account would, therefore, be much larger than originally contemplated. The money now to be disposed of was a fund purposely created for a contingency, and should be put against the outlay occasioned by that contingency. In their private affairs there was not a proprietor present who would regard it as a profit to be divided, although of course he would be so much the richer for it.

The CHAIRMAN, in reply, said the argument of the honourable proprietor cut both ways. Although, through the death of their chief engineers, they had been delayed in the dividends, yet, on the other hand, but for that circumstance, this fund, accruing from the insurances, would not have existed. The division of that amount, in the manner proposed, was a perfectly legitimate application of the money, should that be the determination of the proprietors.

A PROPRIETOR suggested that the new shareholders should take the same interest in this contingent-fund as the old ones.

Mr. HADLAND said the difficulty was, that the new shares had only been paid upon this year, and this fund accrued previously.

Mr. BROWN said the honourable proprietor should bear in mind what had been stated—viz., that the accounts were made up to the 31st of December, and that the call having been paid subsequently, it was not entitled to participate in the division now proposed.

Mr. ALLEN added that, as at present arranged, it made an even sum to the Calcuttans in rupees, and, if the suggestion just made were adopted, it would very much complicate the accounts.

The motion was then agreed to.

The CHAIRMAN said remarks had been made about the retiring directors not being re-elected, and he had already alluded to the able assistance the board had received from those gentlemen, who possessed a thorough acquaintance with the manufacture of gas. He was quite sure, from the little he had seen of gas-making, that no company could be efficiently conducted without there was a large amount of such knowledge among the directors. He was now about to propose the re-election of Messrs. Joseph Brown, George Denny, and Charles Farquharson, as directors; and he would remark that, if there was one person more than another to whom they were indebted for able and zealous services rendered to the company, that person was Mr. Joseph Brown. He was not only ready at the board to co-operate in the most efficient manner, but to go anywhere, and to give the best possible information to his colleagues. That gentleman derived a large amount of his information from the interest which he took in the European Gas Company, which supplied many of the towns on the Continent. Under these circumstances, he (the chairman) had much pleasure in proposing the re-election of the gentlemen he had named.

Colonel ANDERSON asked permission to second the motion. The remarks he had made were not intended as a reflection upon any one of the directors; they were merely the enunciation of a general principle. He had a personal knowledge of these gentlemen, and he was quite satisfied with the way in which business had been carried on by them.

The motion was unanimously adopted.

Mr. BROWN expressed his obligations to the meeting for re-electing him, and in doing so he said he quite agreed with the principle advocated by Colonel Anderson, viz., the infusion from time to time of new blood into boards of direction; but whether that principle applied with equal force to a company of this kind, where a certain amount of practical knowledge was essential, was another question. At the same time, he considered the subject had been very properly brought before them, and had it been acted upon in the present instance, he should not at all have regarded it as personal to himself. In adverting to the heavy losses they had sustained by the death of no fewer than four of their engineers, he added that there was extreme difficulty in getting exactly the men that were required. When everything had been settled, and the very man they wanted was found, upon the knowledge that he would be required to go to India, the whole thing was dashed to the ground; that had been the case in at least a dozen instances. The shipwreck of their materials, added to the losses they had sustained in the deaths of their engineers, had delayed the works not less than twelve or eighteen months.

Mr. LAMBERT moved the reappointment of Mr. James Sydney Stopford and Mr. Henry McLauchlan Backler as auditors of the company.

Mr. HADLAND seconded the motion, which was at once agreed to.

Major BURROWES inquired why Fort William had not yet been lighted with gas? The mutiny in India ought to have operated as an inducement to the completion of the work, because there was much more safety where there was light than where all was darkness.

The CHAIRMAN said he was glad the question had been asked. The fact was, the rebellion in India had placed a considerable check upon all works in India, and particularly in Calcutta. With reference to Fort William, there was a great desire on the part of the officers to have that quarter lighted with gas; and if they succeeded with that contract, it would make an addition of £5000 to their receipts, without involving any additional expenditure, because, as they knew, the expense of plant for 500 lights was as great as that for 1500 lights. As far as he was concerned he felt, as was stated in the report, just as sanguine of the success of this undertaking as he did the day it started. It had been a plant of slow growth, but he had no doubt it would rise to be a sturdy tree, and bear the shareholders good fruit.

A PROPRIETOR inquired whether any further calls were likely to be made this year? If so, he hoped more time would be given them than was done on the former occasion.

The CHAIRMAN said he thought not; but if it should be necessary the suggestion should be fairly considered.

Mr. BROWN said perhaps it would be as well to remark that the extraordinary delay that had occurred in the completion of the works was not altogether a loss to the company, as the commencement of their contract was dated from December, 1858, and they would have a clear 21 years from that date, which probably, under other circumstances, would not have been conceded.

Colonel ANDERSON said he understood the directors had money enough to complete all that was wanted in Calcutta.

The CHAIRMAN said such was the case as far as they could see into the future.

On the motion of Colonel ANDERSON, a vote of thanks to the chairman and directors was cordially adopted.

The CHAIRMAN said he was much obliged to the proprietors for the expression of their good opinion; and in reference to the gallant colonel's observation that perhaps his questions were distasteful, he could assure him it was quite a mistake. He (the chairman) believed that a little ventilation was a good thing, and he only hoped the replies which had been elicited were satisfactory. As to the vote of thanks, he would say for himself and colleagues that they felt strengthened in their exertions in consequence; and the proprietors might rely upon it, that, so long as they had the honour of seats at their board, their interests should be faithfully attended to.

The proceedings then terminated.

THE GAS QUESTION IN CORK.

At the Meeting of the Guardians of the Cork Union, held on Wednesday last—Mr. NICHOLAS MAHONY in the chair—the following tenders for the supply of gas were opened:—

United General Gaslight Company, 29, South Mall, Cork, May 26, 1858.

Gentlemen,—On behalf of the United General Gaslight Company, I hereby propose to supply gas of the best and purest quality to the Cork Workhouse, for one, two, or three years, from the 29th day of September next, at the rate of 2*s.* 6*d.* per 1000 feet, free of meter-rent, including meters, and all mains, pipes, &c., to the meters.—I am, gentlemen, your obedient servant, JOHN SHEA, Agent.

Cork Gas Consumers' Company, Limited—Offices, 72, South Mall, Cork, May 26, 1858.

Gentlemen,—I am instructed by the directors of this company to say that they are prepared to supply the workhouse with gas for one, two, or three years, at the price of 4*s.* 6*d.* per 1000 cubic feet, free of meter-rent. I am also instructed to say that the company is prepared to lay all the mains and service-pipes up to the meters in every part of the workhouse premises where they may be required, free of expense. The directors are also prepared to agree with your board to give the advantage of any reduction which may be made in the price of gas.

In addition to the foregoing terms, the directors are willing to give the Board of

Guardians an option of extending the period of the contract to seven years, on giving three months' notice to this company before the termination of the first contract.—I have the honour to be, Gentlemen, your obedient servant,

Messrs. the Board of Guardians, Cork Union. DENNY LANE, Secretary.

The CHAIRMAN: Well, gentlemen, the question for your consideration is, which of those tenders shall be accepted?

Mr. PARKER: I propose that the 2s. 6d. tender be accepted, on the same principle we always follow—which is, that we take the lowest tender if we are sure the party making it is able to carry it out. (Hear, hear.) I should say the best plan would be to accept the tender for three years.

The CHAIRMAN: The only difference is, that the Cork Company will give us the option of extending the contract to seven years, by giving three months' notice, on the same terms.

Mr. KELLER: We have the power of taking it for one, two, three, or seven years, as we think fit.

Mr. PARKER: I propose we take the tender of the United General Gas Company, at 2s. 6d., for three years.

Mr. SWEENY seconded the proposition.

At this point of the proceedings, Mr. Sarsfield entered the room and took the chair.

Mr. MAHONY: Suppose we take the contract for one year—have we the power of extending it to three years afterwards?

Mr. GIBBINGS: Yes.

Mr. JAMESON: But how would it be if after one year an amalgamation of the two companies takes place?

Mr. KELLER: The proposition of Mr. Parker is, that we take it for three years alone.

Mr. MAGUIRE: Mr. Chairman, this is a matter I think of some little importance, and therefore I trust you will excuse me if I ask attention for a couple of moments, while I endeavour to justify the proposal I make to you, which is, that this board do accept the tender of the local company at 4s. 6d. I shall endeavour briefly to state the reasons why I think you ought to do so. I think, Mr. Chairman, you have complained from time to time, and so has every other member of this board, of the want of manufacturing industry in this country. I believe you feel, as every intelligent member of a board in Ireland must feel, that the social condition of this country is not safe so long as we subsist alone upon agriculture. You will remember that in 1847, 1848, and I think in 1849, we had as many as 7000 people in this house and in auxiliary houses at one time. (Hear, hear.) You had that immense dead weight of pauperism hanging upon the industry of the country. Well, now what was the cause of that? You know—I know, every man here knows—that it was because the country depended solely and entirely upon its agriculture, and the moment its agriculture broke down, that moment everything else broke down in Ireland. (Hear.) There was no other prop left; we had no tall chimnies in Cork as we had at one time; we had no manufactories to depend upon; nothing to fall back upon; there was utter and irredeemable ruin, and it was only through the mercy of God in having given us abundant harvests that the country was restored. (Hear, hear.) Now, what we want in Ireland is the development of local industry; we want in the south of Ireland the same kind of thing, if possible, as they have in Belfast. (There were here some symptoms of interruption, a few gentlemen speaking to each other in a suppressed tone of voice.) I trust, Mr. Chairman, that for one moment gentlemen will give me their attention, because this really bears upon the question, and however gentlemen may vote against me to-day, I feel perfectly certain, as men of plain sense and as Irishmen, they must agree with every word I state upon the matter, however inconvenient they may think it would be to adopt the higher tender upon this occasion. (Hear.) Look at Belfast—look at the entire northern province of Ireland—see the contrast afforded by it to the condition of the other three provinces during that period. We were plunged in misery and destitution; our rates were enormous; our gentry were utterly swept away; many a great and noble name was swept away from the land. (Hear, hear.) I know many great houses which were given up to the filth and squalor of pauperism during that period. (Hear, hear.) I know, within twenty miles from this city, one of the most splendid mansions ever built in Ireland crowded with paupers, who appeared to enjoy a malicious satisfaction in debasing and defacing everything beautiful and ornamental in that noble structure. You had a social revolution here, owing to the fact that you had no manufactories—none of those things which enabled the north of Ireland to withstand the effects of that terrible crisis. (Hear.) Well now, sir, there is an attempt, owing to a salutary law which was passed some time since—an attempt to revive local industry amongst us, and the first successful attempt made in Cork was the establishment of the Cork Consumers' Gas Company. (Hear.) Why was it started? Because there was an English monopoly—(hear)—and because we in Cork thought it was far more sensible that any employment which could be given, and any profits that might arise out of a transaction of the kind, should go into the pockets of a local community; and we also took this into consideration, which weighed more with the originators of the project than any other feeling—that it was well to make a commencement, and to show what could be done by organization; to show what could be done by combination, and that the people of this country should be encouraged to put their moneys together, and to make an effort for the establishment of local employment in their districts. (Hear.) I tell you now that this endeavour has succeeded beyond all expectation—(hear)—and I call upon you to-day not to do anything which would seem to throw a slur upon that undertaking, or which would seem to throw cold water upon a great local movement for a good and useful object. (Hear, hear.) Now, Mr. Chairman, to show you that something has already originated from that movement—for I say in plain language that it will be the father and mother of many future attempts at reviving industry in the south of Ireland—(hear)—what has been done? Why, sir, suppose you wish to add a wing to your conservatory, a company has been started that will be able to give you the best bricks, equal to Bridgewater bricks, made from local material, by local labour; we shall be able to expend in labour alone as much as £100 a week in the new brick-fields. That is movement No. 2; and I assure you, Mr. Chairman, I do not exaggerate when I tell you there are two or three other feasible projects—projects which any sensible body of men will say are prudent and feasible. These are now in contemplation, but if that gas company went down it would not ruin any one, thank God! for the shares are so spread amongst the community that it would not hurt a single human being, in a pecuniary sense—(hear, hear)—but I pledge my word and honour as a gentleman, it is my profound conviction that if that company failed, you would not have another effort on the part of our local community for the next fifty years. That is the reason I plead the cause of the Cork Consumers' Company here to-day. (Hear, hear.) What are we in Ireland calling for at the present moment? There was a measure brought in by Mr. M'Carthy and myself sometime since for amending the law relative to the removal of the Irish poor. We do not know whether we shall get that carried or not. Why? Because the selfishness of England rises up against us. Liverpool has so strong a claim against us that she must be heard against the whole country. Why? Because they send back 2000 paupers a year to this country, no matter how many years they may have spent in England. They may have spent their lives there, but the moment that age or sickness incapacitates them from work they are sent over to this country as worthless. England repudiates all connexion with them. (Hear, hear.) Now, if we had local industry amongst ourselves, we would not care about that, for we should have employment for all. My object is to give that employment, that we may depend upon ourselves rather than upon the clemency or the mercy of the people of England. (Hear, hear.) We know the mere pressure of poor-rates will make men selfish; it makes a class in this county selfish even against their own countrymen; but it hardens the heart of every English parish and of every English official, so that their only object is to turn and shuffle out the Irish poor by every means they can. (Hear, hear.) I appeal to every gentleman who hears me, am I stating anything that is not true?

Mr. KELLER: Indeed you are not.

Mr. MAGUIRE: Well, I heard one of the guardians—I believe the honourable proposer of the resolution—talk about the amalgamation of these two companies. I tell you there is no more chance of amalgamation than there is of the sky falling. I would resist it tooth and nail. (Hear, hear.) We want to have no English company one way or other. We will fight our battle, although these gentlemen see what chance of the game they have; and though a few boards may give them a kindly lift, the public of the city are in our favour. We will fight our battle fairly and legitimately to the last. (Hear.) As a proof that we have already won the battle, I tell you one fact, for the truth of which I pledge my own character, that we have at this present moment 1292 consumers upon our list. When last I made a statement, about six weeks or two months ago, upon the subject, we had 1240 consumers; this day we have 1292, and I believe in some six months more we shall have something over 1400. (Hear.) So that I don't come to you crying *peccavi*, or rather add *misericordiam*. I don't come to you as an humble suitor at all; I come as an act of justice here this day, and I tell you, whose whole duties are almost entirely consequent upon the pauperism of the city, not to destroy that which keeps down pauperism. (Hear, hear.) Why, sir, if you had different branches of manufacture in the city you, perhaps, might have only 1000, 500, or even 300 in the house; but what is the fact? At the least pressure of poverty you have 3000, 4000, or 5000; you have had 7000 people before now. I state what every sensible and rational man must agree with.

Mr. JAMESON was understood to say that pauperism could never attain the number it formerly reached, inasmuch as the people were not in the country.

Mr. MAGUIRE: With every respect for the sagacity of my two friends (Messrs. Parker and Jameson), there are wiser heads than that of either one or the other—a great many wiser heads. (Laughter.)

Mr. JAMESON: We won't dispute that.

Mr. MAGUIRE: I have a profound respect for Mr. Jameson and my other friend; however, I know they have both given their time and service untiringly for the benefit of the public, but I have known wiser, sager, and even longer looking people—(a laugh)—who say there is more danger in the present state of things in Ireland than people imagine. The people are falling back more upon the potato crop than you or any friend of the country would like. Look at the statistical returns of the last two years. You will find people falling back upon this dangerous crop, and if anything happened to it to-morrow you would have six thousand people here and in Barrack Street and other auxiliary houses before the winter was out. (Hear, hear.) This I look upon as really a matter of great importance—(hear, hear)—and now, sir, I say that as an act of justice we have some claim upon you. I want to show to the guardians, however they may feel coerced to decide against me, that we have some claim upon their consideration. You have deemed it advisable by a resolution of this board to substitute gas for candles. Now, it is owing to us you have had a reduction of 33 per cent. in the price of that article. (Hear.) We put our friend Mr. Gibbings completely out of the question; we only mean to deal with a number of London gentlemen who endeavour—and fairly and properly endeavour—to get as much as they possibly can from us as long as we submit to it. (Hear.) Well, now we said to them in the council time after time, "If you give us gas at a fair price, you shall hear no more of any opposition." What did Mr. Gibbings say to that? He stated in the council over and over again—every one heard it—"We cannot give gas at 5s. per 1000." Now we have proved that we can give gas—I assert it, at a remunerative rate, for 4s. 6d. (Hear, hear.) But this I assert that the gentlemen who give gas at 2s. 6d. are cutting their own throats, for it is utterly impossible to manufacture it with a profit at that price. (Hear.) I ask why is gas offered to us at that price? You, Mr. Chairman, who have no local interest in the city—I ask you as an impartial goaler on the ditch, looking down with calm sincerity on the conflict underneath—I ask you why did they come down from 7s. to 2s. 6d.? They said they could not give it at 5s. 6d. unless with ruin; they now come down to 2s. 6d. For what? For the purpose of breaking down this effort of local enterprise; for the purpose of breaking down a company established to resist monopoly, and with the far better object of making some commencement in reviving the industry of the land—some commencement of restoring manufacturing industry in our city. (Hear.) I ask you with great respect, are you to be made the tools of those London gentlemen who send back to us the worn out Irish poor as burdens upon your necks and pockets? Are you to play into their hands? If you adopt the 2s. 6d. tender you do so. At the same time our company is beyond and above any folly on the part of this board—for I respectfully say to you, any adoption of a tender which is offered for the purpose of destroying local enterprise is folly upon your part, however respectable and wise you may be in other matters. That is my conviction. It is not necessary for me to urge the matter more upon you. I will conclude by stating that if this company are able, as we shall probably be able, to reduce gas perhaps down to 4s., to 3s. 10d., and to 3s. 9d., in the course of two, three, or four years, we will if you accept our tender give you all the advantages of that. You shall have all the advantages which every other consumer in Cork will have. (Hear, hear.) Now, let me urge one point more. My ingenious friend, Mr. Gibbings, talks of monopoly very often. (Laughter.) I want to show you that you have no danger of monopoly. If there were but some half-dozen gentlemen in that company, there would be a monopoly; but our company includes 600 gentlemen in the city of Cork, who are themselves consumers. So that while they protect their own interests, they protect the interests of the public. Under these circumstances, if the London gentlemen cease to illuminate our darkness, and confine their energies to their own benighted locality, it would not be the slightest disadvantage or danger here—not the slightest. You will have to deal with your fellow-citizens at all times—you will have to deal with those who have given a reduction of 33 per cent. in the price of gas, who

will give other reductions ere long—you have to deal with those with whom you can treat on equal terms at all times—you have to deal with those from whom you need never want protection, who are endeavouring to diminish your rates, who are endeavouring to establish local industry—you have to deal with those whom it is your duty to encourage, because their success must tend to diminish the rates, and render the duties of Boards of Guardians more pleasant and less onerous than before. (Hear.) Under these instances, I beg to propose that you adopt that tender. (Hear, hear.)

Mr. N. MAHONY begged to second the proposition, for this reason. If gentlemen expected to get anything less than it cost they would be sure to be disappointed. Now, they had the guarantee of the Cork Company's deed of partnership preventing them from dividing more than 8 per cent., while they could get gas made on the best possible principle at their new concern, where all the new improvements had been availed of; therefore, with the guarantee that the company could not divide more than 8 per cent., they must get gas on the best possible terms; but if the English Company succeeded in getting the Cork Company into difficulties, they might have to pay a much higher price for it. (Hear.)

Mr. GIBBINGS: I feel very much the difficulty and the disadvantage under which I labour in addressing almost any meeting after my friend Mr. Maguire, because I don't feel that I can clothe my ideas in the same forcible language, or that I can press them in the same forcible manner which is so well calculated to carry away with him, at least on ordinary occasions, gentlemen who have perhaps no time either to deliberate or look deeper than the surface. (Hear, hear.) Now, sir, can I attempt in any way whatsoever—I am too old; I am afraid to draw upon my imagination. (Laughter.) I am obliged to confine myself to facts and figures, and I did not expect when this was a mere matter of business that there could be anything of a different nature introduced into this discussion. (Hear, hear.) I think, sir, that when I confine myself to plain facts and figures, and when I address myself to you and to this board, as men of business, upon a pure matter of business, which I believe I understand a little about, I do not feel that Mr. Maguire has so much the advantage over me. (Hear, hear.) He has told you, in the first instance, that if you take our contract you are endeavouring to create a monopoly.

Mr. MAGUIRE: No, no; I did not say that.

Mr. GIBBINGS: You said something very like it. (Hear, hear.) You said the result would be, if this was thrown into our hands, to establish a monopoly which before now has been characterized as unscrupulous, as wanton, and every abusive epithet that was possible has been applied to it. But, sir, he forgets that the company I represent were invited to Cork thirty-four years ago, when no men could be found to invest their capital in such an undertaking. (Hear, hear.) They invested a very large capital in Cork, and they have for thirty-four years so conducted their business as that there was never a single complaint substantiated against them—(hear, hear)—on the contrary, they have been over and over again thanked by the public bodies of the city of Cork for the liberal manner in which they dealt with them. (Hear.) It is only right to say to you that from the first hour to the last hour of the contract they never, in any instance, charged the sum they were entitled to do under the contract of the citizens of Cork. (Hear.) With respect to employment, I will only say that our company employs just as many as the other. (Hear, hear.) That we may take for granted. During that period of time we have paid for labour alone in Cork at the rate of £1500 a year in summer, and over £2000 in winter. The first instructions I got from the company I represented, so long ago as 1824—the first intimation was that they would get everything in Cork that could possibly be procured there—that nothing should be imported that could be made in Cork; and that has been followed out to the present day. (Hear, hear,) Look at the lamp-posts even. The lamp-posts in the streets were every one of them made in Cork. With about twenty or twenty-five exceptions latterly, all have been made in Cork. Within the last few years—in 1856—when we came to enlarge our works, we laid out every shilling in the city of Cork—(hear)—though we had tenders for it all from other places at a lower rate. (Hear.) To one founder in Cork, in 1856, I paid over £1000 in those improvements. (Hear, hear.) I think, then, that, so far as the employment given by the company, we stand as high as any company in the world can stand, and that we have every claim upon the forbearance and support of the citizens. And now as to the idea of our giving in this tender for the purpose of overcharging you, the right way is to judge of the future by the past. (Hear, hear.) We have never charged the full amount of our contracts. (Hear, hear.) We are also restricted to 6s. per 1000 for ten years by an Act of Parliament—(hear, hear)—and I think I can guarantee that you will not for the next ten years have it at 5s. (Hear, hear.) But the principle upon which Mr. Maguire rests is our giving gas at 2s. 6d., which is not a remunerative price. I admit it is not; and the reason we do that is this—on the formation of the Gas Consumers' Company in Cork, it was avowedly got up for four different purposes. One was to receive cheap gas—(hear, hear)—another was to put into the pockets of the citizens the fabulous profits—for they were perfectly fabulous, as they have found out since, I believe—to be derived from a gas concern. Another object was to get rid of the monopoly. How? By "extinguishing"—such was the expression—by driving out of Cork the men who have expended every shilling they ever could possibly expend in Cork for the last thirty years; who have always and invariably given gas at a lower rate than they were required to do by their contracts; who, before there was a single pipe of the Consumers' Company laid, offered to give the gas to the citizens for thirteen years at the price at which the contract was afterwards given to the Consumers' Company.

Mr. MAGUIRE: 5s. 6d.

Mr. GIBBINGS: Aye, the very price at which the contract was given to the Consumers' Company afterwards, but the Town Council refused to take it either for three years or thirteen years. (Hear, hear.) Now, the reason, as I tell you, we now are compelled to protect ourselves, is for the protection of our own property. (Hear, hear.) We feel it is necessary to protect our property, otherwise the £50,000 or £60,000 we have spent was to be sent adrift, and not to be worth a farthing; and I need not tell you that men who have a very large income or expenditure in a place will not run away from it, nor will not let it be wrested from their hands with impunity—(hear, hear)—they must adopt every course it is possible for them to take.

Mr. MAGUIRE: Hear, hear—exactly.

Mr. GIBBINGS: Yes; and as this opposition and competition has been forced upon them, they are determined to give the citizens of Cork the full benefit as long as ever they ask for it.

Mr. MAGUIRE laughed.

Mr. GIBBINGS: Mr. Maguire may laugh.

Mr. MAGUIRE: Oh dear me, I am delighted to hear it. It won't last long.

Mr. GIBBINGS: Mr. Maguire has turned prophet. I am too old to prophesy—I can only deal with the present. Mr. Maguire has prophesied that a great many things will take place; perhaps he will find they will not. (Hear.)

Mr. MAGUIRE: Perhaps so; but I think I am right yet.

Mr. GIBBINGS: With respect to Mr. Maguire, I think I have shown you they could have got it from us as cheap as they took the contract from the Consumers' Company afterwards for; and as to dividing the profits amongst the citizens, that is a very problematical thing yet. (Hear, hear.)

Mr. MAGUIRE: No, indeed; by no means.

Mr. GIBBINGS: With respect to driving Englishmen out to get rid of monopoly, which was never proved to be any of the things that were attributed to it, that is to be done by driving them out and establishing another monopoly—(hear, hear)—and if you look at the proceedings of the Consumers' Company from the day they began, which is not quite two years ago, to the present hour, I do not think you would have much difficulty in coming to a decision as to which would be likely to be the worst monopoly.

Mr. MAGUIRE: Hear; not the slightest.

Mr. GIBBINGS: Their first step was to give themselves the contract—(hear, hear)—because 31 shareholders voted on the occasion of the council giving them the public lighting.

Mr. KELLER: Perfectly right.

Mr. GIBBINGS: Their next movement was in another place to do exactly the same thing, and their next was to threaten every man who did not deal with them that he should neither be a mayor, an alderman, nor a common council man if he did not deal with them.

Mr. KELLER: That is the greatest mistake you ever made.

Mr. GIBBINGS: I saw that threat used—I read it, and I heard it. (Hear, hear.)

Mr. KELLER: That is the greatest mistake you ever made in your life.

Mr. GIBBINGS: That threat was made in the month of January. I saw it, I read it, and I heard it, that no man who did not support the new company was to be elected to the office of mayor, or of alderman, or common council man.

Mr. SHEEHAN: It is my opinion at all events. I would not elect him on the Town Council nor on the Harbour Board either. ("Hear, hear," and great laughter.)

Mr. GIBBINGS: You see Mr. Sheehan bears me out. ("Hear," and laughter.) I think that that would be a less agreeable monopoly than that which you had for a great number of years. (Hear, hear.) Now, as you must all admit, there is not the slightest doubt that the United General Gas Company will carry out their contract faithfully and well, as every other contract which they have ever made has been carried out with the public. I do not think you can have any hesitation in discovering that 2s. 6d. per 1000 is cheaper than 4s. 6d.

Mr. KELLER: To be sure it is.

Mr. GIBBINGS: It will make a very considerable difference to the union, and with regard to the ratepayers being concerned for this new company, I admit, with Mr. Maguire, that there are perhaps 500 ratepayers concerned, while there are 24,000 ratepayers in the union.

Mr. MAGUIRE: I speak of the electoral division of Cork.

Mr. GIBBINGS: It is not the electoral division that is called on to pay this; the rural divisions are to pay, and the rural guardians are interested in this question.

Mr. MAGUIRE: I 'll engage they will answer.

Mr. GIBBINGS: I think it is an extraordinary thing to ask 24,000 ratepayers to assist a speculation which a great many people think was not well considered when first entered into, and which, by-and-bye, may turn out to be so. (Hear.) I think I may safely leave with you and the Board of Guardians the determination of the subject. I do not think it necessary to enter into some of the topics pressed into this matter, and I shall say no more than that if you give our company the contract we will serve you faithfully, and I now leave the question for your impartial consideration. (Hear.)

Mr. BRUCE said Mr. Maguire was no doubt right to support the company in which he was interested, but the other guardians would be dealing very unjustly by the ratepayers of the union if they were to accept the highest tender. (Hear.) He did not think they had law for doing so. The acceptance of the lower tender would make a great difference in the year. (Hear, hear.)

Mr. MAGUIRE did not care how the matter went, one way or other. Personally, he was entirely indifferent; and if the honourable guardian who had said that he was interested in the new company only knew a little more of him, he would know he was not, but without the slightest disrespect to his friend Mr. Gibbings, every one knew that he was interested.

Mr. BRUCE: You said yourself that you were interested; that was the reason I said so.

Mr. MAGUIRE: I am interested as an Irishman, as one anxious to establish industry where industry does not exist. With great respect for Mr. Gibbings, it requires that amount of coolness which age and experience alone can give that there was no complaint ever made against the old company. How does it happen that there are 1300 consumers on our list?

Mr. GIBBINGS: That remains to be proved, and after it is proved it remains to be seen whether they will ever pay you for it. ("Hear," and laughter.)

Mr. MAGUIRE: All I can say is we have the same persuasive power at our disposal which has been always exercised by our predecessors.

Mr. SHEEHAN: People don't pay you sometimes.

Mr. GIBBINGS: Indeed they don't. (Laughter.)

Mr. MAGUIRE did not deny that those gentlemen—the old company—had given, and very properly given, every employment they could in the city, but where did the profits go? Did a single shilling of the profits jingle in the pocket of a single ratepayer in Cork? Not a farthing. His friend (Mr. Gibbings) got some small thing out of them. (Cries of "Question.")

Mr. TARRANT said he had always pleasure in hearing Mr. Maguire, but he had made a very able speech before.

Mr. MAGUIRE: I merely want to answer some points. Mr. Gibbings talks of fabulous profits, and all that kind of thing. I went over some time since the share list of the gas companies of the United Kingdom, and find they were making 8, 9, and 10 per cent. We are limited to 8 per cent.; any profit beyond that goes to the reduction of the price of gas I remember the evidence given by this gentleman before the committee of the House of Commons was that this company made 12 per cent. in Cork.

Mr. GIBBINGS: Eight three-quarters was the evidence given. (Hear, hear.)

Mr. MAGUIRE said, as to the Town Council having given the contract to themselves, the law allowed them to do so.

Mr. GIBBINGS: Unfortunately; but at the corporation only. (Hear, hear.)

Mr. SHEEHAN: Before you put that, Mr. Chairman, talking of 1846 and of the great distress of Ireland then, I say it was the Whig Government were the cause of that. (Laughter.)

The CHAIRMAN: Order, order, Mr. Sheehan; I must really stop you.

Mr. SHEEHAN: Why, sir, I remember in 1846——

The CHAIRMAN: You are a young member of this board, and perhaps not aware that we have unanimously come to a resolution not to introduce one word that had a single political tendency or object at this board. (Hear, hear.)

Mr. SHEEHAN: Sir Robert Peel was in office then, sir, and he set all the mills in Ireland at work; but there was a conspiracy got up against him by some of our own party, mind you—(laughter)—and Lord John Russell got in, sir; and what did he do? He called a meeting of all the corn men in London and riz the price of Indian corn from £9. 10s. a ton to £19 a ton; and he starved the poor by it, that same infernal Lord John Russell. (Great laughter.) I hope we shall never have such a fellow in power again. (Renewed laughter.)

A poll was taken.

For taking the contract of the United General Gas Company—Lieut.-Col. Wood, Dr. Corbett, Messrs. Tooker, Wood, Biggs, Harvey, Tarrant, Harris, Barter, Cunningham, Dwyer, P. Sarsfield, Exham, Aylmer, Bruce, Newenham, Harrison, White, Casey, Sweeny, Parker, Jameson, Julian, and Swan.

For the Cork Consumers' Company—Messrs. Sheehan, Keller, Martin, Maguire, and Mahony.

Mr. Gibbings and Mr. Butcher did not vote.

The tender of the United General Gas Company was accordingly accepted.

Mr. MAGUIRE: I wish the English Company joy of profits of it, at any rate.

The CLERK: What security will you give?

Mr. GIBBINGS: We will give you any security you may deem necessary.

Mr. MAGUIRE: I tell you you won't have that contract adhered to for twelve months.

Mr. GIBBINGS: That is another of your prophecies.

Mr. MAGUIRE: It is, and you may take it down too.

The CHAIRMAN: You are an incorporated company, I believe?

Mr. GIBBINGS: Yes, with £200,000 or £300,000 laid out in Dublin.

Mr. TARRANT said the security was a vital question.

Mr. MAGUIRE: Ah! nonsense; that is all flam.

Mr. AYLMER: It is not quite clear that the seal of the company will be sufficient security.

Mr. MAGUIRE: I don't care about the security. Sure, they can give you their blood.

Mr. GIBBINGS: Well, we will give you our blood. (Laughter.)

Mr. MAHONY: It is very easy for the gentleman to give security.

Mr. MAGUIRE: Oh! to be sure it is.

Mr. MAHONY: It is better to have it.

Mr. MAGUIRE: Let me beg of you not to be straining at a gnat after you have swallowed a camel. It is all flam. Sure, every one knows it is all flam. What a wonderful anxiety you have about the security!

Mr. PARKER: The question is what amount of security we shall ask for.

Mr. MAGUIRE: Oh, I would not require any security. I am perfectly content without any. I am sure the contract shall be kept, but I am also sure they will not be doing it.

Mr. GIBBINGS: You mean, I suppose, that you will purchase our works.

Mr. MAGUIRE: Exactly.

Mr. GIBBINGS: You shall have them now for £60,000.

Mr. MAGUIRE: Would you split the difference?

Mr. GIBBINGS: No, I will not.

Mr. MAGUIRE: In any difficulty you have I shall be happy to give you assistance from our company. (Laughter.)

Mr. GIBBINGS: Thank you. We offered your company assistance by giving them the manufacture of the city of Cork to the amount of £1600 in lamp-posts, but they would not take them, and got them from England. (Hear, hear.) There is local industry for you. (Hear, hear.)

Mr. SHEEHAN: Is that the fact?

Mr. GIBBINGS: It is the fact, and I commend it to the attention of gentlemen who wish to encourage local enterprise up. We offered them our lamp-posts, which are all Cork manufacture, every one of them, for £1600, but they would not accept them; and what did they do? They got them made in England.

Mr. SHEEHAN: Why then that was denied, and it was a great shame on the part of the company. (Hear, hear.)

Mr. LANE: I beg to say that the proposition made to us was an insiduous one. They told us they would give us the lamp-posts when we were in a position to light the city of Cork. We could not accept the contract on those terms.

Mr. GIBBINGS: I was in Cork at the time, and one of the directors was here, and if they had any real wish or intention of purchasing our lamp-posts, they might have told us what part of our offer they considered objectionable, and we would have put it in any form they liked.

The subject dropped, and the board adjourned.

The *Cork Constitution* has the following comments on these proceedings:—

"The guardians of the Cork Union accepted on Wednesday the tender of the old company, in preference to the tender of the new, and what else could conscientious and sensible men have done? Were any citizen deciding for himself, with nothing but his interests to influence him, how could he have decided differently? It was simply a question of economy:—it was a question of 2s. 6d. or of 4s. 6d.; and, though a citizen acting only for himself and dealing only with his own money might, if he chose to yield to other motives than his interest, prefer paying the higher sum, the guardians, who are spending the money of others, could with no propriety have done so. It is preposterous to push the success of a private speculation at the expense of the ratepayers, and it is unseemly as well as preposterous to seek to obtain for it the countenance of public bodies made up so largely, as some of our public bodies are, of its own members. We side with neither company; we wish prosperity to both, and to all who deal with them; but we wish justice to the ratepayers, and justice to the ratepayers the guardians, as became them, have almost unanimously done. Moreover, there was no pretext for the plea put forward on behalf of the new company. That company, according to the statement of an advocate who knew well how to urge to the best advantage all that could be urged for it, is in no danger. If it can pay the 8 per cent. to which its profits are limited its stability is secure, and, for the sake of the friends concerned in it, we shall be happy to hear that it is in a position to pay eight times 8. It is in no way affected, therefore, by the preference bestowed on the old, neither would a penny more have been spent among our tradesmen had its tender been accepted, for the old company employs at least a proportionate quantity of local labour, and never sends out of the city for material a shilling which it can spend here, nor imports an article which it can procure here. The case, then, stands thus, that while the new company is not injured the ratepayers are served—a result which by all justice-loving members of the company will be accepted as compensation for any disappointment they may in the first instance have felt.

"Mr. MAGUIRE's argument is repeated in the *Examiner* of yesterday evening, and is followed up by an eager appeal to the gas consumers:—

"Is it your wish to fall back into the hands of the London gentlemen who charged you 7s. as long as they could—who opposed every effort at throwing open the contract for public, and therefore private, lighting to general competition—and who, if they be successful in beating down the local company, must, as a matter of necessity, indemnify themselves, by a high price, for their ruinous rate of 2s. 6d. per 1000 feet of gas? Let the Cork Company be beaten, and driven from the field, and the price of gas would range from 7s. to 8s.; and as to the *quality*—why it is only necessary to remind the consumers that there were the most serious and continuous complaints about the London Company even when opposition was threatened, and to suggest the more than probability, the actual certainty, of these complaints being even more continuous and more angry when opposition was impossible. Destroy the Cork Company, and the London Company becomes at once endowed with perpetual life; for once put the extinguisher on so promising, and so practical an undertaking as the Cork Company, and you may bid 'good bye' to all such efforts for the future.

"It is not easy to understand this, or to reconcile it with the flourishing account given of the company. How is the company to be 'destroyed?' and who is going to destroy it? Yet the crew of a sinking ship could not call out more lustily for help. The cry is intelligible only on the supposition that the gentlemen want to secure to themselves a monopoly similar to that from which they profess their anxiety to deliver the citizens. Look, for example, at what follows:—

"If the Chairman of the London Company is to be relied on as an authority, there are 500 consumers left to that company. That number must be reduced, and as speedily as possible. How is this to be done? By ward organization. By neighbour speaking to neighbour. By consumer influencing consumer. By citizen remonstrating with citizen.

"If citizens choose to be dragooned in this manner, and if shareholders can consent to go about canvassing for their own pockets, it is their concern, not ours; but these are 'ways and means' which respectable companies generally leave to companies neither whose claim nor whose character is as unequivocal as it should be."

Price Current.

CASTINGS, per Ton.

Average Weight of Cast-Iron Gas-Pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow	Newcastle.	Wales.	Yorkshire, Derbyshire and Staffordshire.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	4 10 0	2 14 0	3 0 0	4 0 0	4 5 0
1½ and 2 inches Socket Pipes	7 15 0	7 0 0	7 5 0	7 10 0	7 5 0
2½ and 3 " " "	7 5 0	6 15 0	7 0 0	7 5 0	7 0 0
4 and 5 " " "	7 5 0	6 10 0	6 15 0	7 0 0	6 15 0
6 in. & upwards " "	7 0 0	6 5 0	6 5 0	6 15 0	6 5 0
Retorts, 1st fusion, hot blast	6 15 0	...	6 15 0	7 0 0	6 15 0
" 2nd " cold "	7 15 0	...	7 0 0	7 5 0	7 0 0
Tank Plates, ¼ thick and above	7 5 0	6 10 0	6 15 0	7 0 0	6 15 0

COALS.

NEWCASTLE.	s.	d.		SCOTCH CANNEL.	per ton.
Unscreened.					
Whitwell Primrose	6	3	per ton	Boghead, at Leith	32s. 0d.
Medomsley and Burnhope	6	6	"	Kirkness, best	23 0
Pelaw	6	9	"	Capeldrae, 1st quality	20 0
Eighton Moor, New Pelton, Peareth, South Pelaw, Washington Hutton, & South Peareth	7	0	"	" 2nd "	12 6
				Lesmahago, at Glasgow	25 0
				" " Leith	27 6
				Arniston	22 0
Pelton	7	9	"	Wemyss	20 0
Ramsay's Newcastle Cannel	16	0	"	Knightswood	18 0
				Pirnie	15 0

SUNDRIES.

Best Newcastle fire-bricks	60s. per 1000	English pig lead	£22 per ton
" " " clay	12s. per ton.	Welch bar iron, in London	£7. 5s. "
Cliff's fire-bricks at Wortley, 57s. 6d. p. 1000		Foreign spelter	£25 5s. "
Ingham's fire-bricks at Wortley, 55s. p. 1000		English block tin	£122 "
Tough cake copper	£107. 10s. per ton.	Banca " "	£118 "
Tarred rope yarn	26s. per cwt.		

WROUGHT-IRON TUBING, subject to 40 per cent. Discount.

	2 inches.	1¼ inch.	1½ inch.	1 inch.	¾ inch.	½ inch.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent welded tubes, from 2 to 12 feet, per foot	1 8	1 0	0 10	0 7	0 5	0 4½
" " " 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting pieces, or long screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, springs, and elbows—wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron cocks	17 6	9 6	7 6	4 6	3 3	2 6
" with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing sockets, caps, plugs, and nipples	1 3	0 9	0 8	0 6	0 5	0 4
Plain Sockets	1 0	0 8	0 7	0 5	0 4	0 3
Syphons, 2 quart	15 0	14 0	13 6	13 0	12 6	

FREIGHTS.

Coastwise—Newcastle.	Per Ton.	*Foreign.*	Per Keel.
Chatham & Roches-	5s.6d	Boulogne & Calais	£ 7 0s
Cork (ter	8 0	Barcelona	23 0
Dover	5 9	Bordeaux	£13. 10s. to 14 0
Dublin	8 6	Cadiz	15 10
Exeter Quay	7 3	Copenhagen	£9. 10s to 10 0
Folkestone 5s. 8d. to 6	1¼	Dieppe	£7. 10s. to 8 0
Hastings	—	Genoa	21 0
London 5s. 3d. to 5	9	Hamburg	7 15
Lowestoft & Yar-	4 3	Havre	8 5
Lynn (mouth	4 6	Leghorn	21 0
Portsmouth	6 6	Lisbon	15 0
Plymouth	6 9	Rotterdam	£6. 15s. to 7 0
Whitstable	5 9	Stettin	12 0
Weymouth	—	Trieste & Venice,	£21 to £24

PRESENTATION OF A TESTIMONIAL TO MR. H. YOUNG.—The workmen of the Birmingham and Staffordshire Gaslight Company, West Bromwich, on Saturday afternoon, the 22nd ult., presented H. Young, Esq., the manager, with a silver inkstand and appendages. On presenting them, Mr. David P. Mudie said that he was requested, on behalf of the workmen, to read the following address:—"Sir,—Wishing to express our regard and testify our esteem, and to acknowledge our appreciation towards you, we, your servants, present this inkstand as a remembrance from us. We can assure you, sir, that it is with great pleasure we dedicate this token to a laudable and respected master." The inkstand was then presented by Mr. J. Griffith. Mr. Young, in an appropriate speech, thanked the workmen for their presentation and display of good feeling, after which he was warmly applauded. The inkstand bore the following inscription:—"Presented to Hugh Young, Esq., gas engineer, by the workmen of the Birmingham and Staffordshire Gaslight Company, West Bromwich, as a token of regard and esteem, and as an acknowledgment and testimony of their appreciation of him as a master.—May 22, 1858."

GASLIGHTS IN A COAL-PIT.—It is well known that one of the greatest difficulties coal-miners have to contend with in the prosecution of their arduous labours in the bowels of the earth is a deficieney of light, the artificial means of illumination afforded by the Davy lamp being very inadequate to the requirements of the men in the thick darkness of a coal-pit. It has recently been found safe and practicable, under proper precautions, to introduce gaslights in coal-mines, thereby vastly facilitating the operations of the colliers. This valuable improvement has now been adopted at the High Elsecar Colliery, near Barnsley, the property of Earl Fitzwilliam, and naked gaslights are now burning in all the board-gates and stables. After the experiment thus made has been fairly tried and found successful, gas will be introduced into every part of the workings, and, where absolutely necessary, through the medium of the Davy lamp.

LLANDUDNO.—During this week the gaslight has been introduced into this attractive watering place, under the superintendence of Mr. George Walcott, the gas engineer, only, however, as yet partially, as the different houses being prepared for gas are lighted in their turn, after having first undergone a careful examination. When the whole of the shops, &c., are ready for lighting, it has been proposed by an influential member of the company to give some celebration to this period in the progress of Llandudno, a notice of which will appear in our columns. We are advised that the general arrangement of the Llandudno Gas-Work is of the highest order.

THE SYDNEY WATER SUPPLY.—The editor of the *Sydney Magazine of Science and Art* has given public confirmation of the suspicions already existing as to the dangerous action of Sydney water upon leaden pipes—by detailing his own painful experience of this action in the shape of two very severe and dangerous attacks, which were traced to the use of water from a new cistern, in which a large quantity of the metal was found in solution. These attacks were accompanied with all the symptoms of bilious colic, and were treated as such, until by a chemical analysis of the water the cause was discovered.

Advertisements.

ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

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NEWPORT, MONMOUTHSHIRE,
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ROBERT MACLAREN & CO.,
EGLINTON FOUNDRY, GLASGOW,
Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

FIRE-CLAY GAS RETORTS.

ESTABLISHED IN 1795.

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WORTLEY FIRE-BRICK WORKS, near LEEDS.

THESE RETORTS are unrivalled in excellence, being the BEST FINISHED INTERNALLY, and THE MOST CORRECT IN FORM, of any in the Kingdom. From the peculiar composition used in working up the face of the material, they are rendered unusually smooth, close, and FREE FROM SURFACE CRACKS, thus, in a great measure, preventing leakage and the adhesion of carbon to their interior service.

To meet the yearly increasing demand of UPWARDS OF THIRTY SEASONS and to carry out the late improvements in the manufacture, the Premises have been re-erected and much enlarged, and Engineers may rely WITH CONFIDENCE on their orders being completed with a greater regard to despatch than by any other House.

THE WORKS ARE WELL SITUATED

For EXPORT from the Ports of { LONDON, LIVERPOOL, HULL, MIDDLESBRO', HARTLEPOOL, and STOCKTON.

FIRE-BRICKS, LUMPS, GUARDS, TILES, AND CLAY OF THE SAME QUALITY.

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WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

London Agents, CHADWICK and AKEROYD, Willington Stone Wharf, Regent's Park Basin.

N.B.—*Export orders continue to have prompt attention.*

LIVESEY FIRE-CLAY WORKS,

NEAR BLACKBURN, LANCASHIRE.

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

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Orders for London and South of England to be addressed to Mr. NEWTON, Agent for the District, 13, Westbourne Terrace, BARNSBURY PARK (N.).

N.B.—A few Retorts of each size, and a large stock of Bricks and Lumps, always on hand at the above Wharf.

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DIRECT-ACTING GAS-EXHAUSTERS,
supplied either with or without Steam-Engines and Boilers.

FOUR-WAY DIAPHRAGM VALVES,
one of which answers the purpose of THREE ordinary Valves, as applied to Purifiers, or in shutting off and passing Station-Meters, Governors, or other apparatus, while the Connecting-Pipes are also much simplified.

RETORT SETTINGS,
designed to be heated by Tar alone, and with a total absence of Smoke.

Illustrated circulars, giving references and every information, may be obtained on application as above.

WEST and GREGSON,
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Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide Valves, &c. &c.

W. and G. would respectfully call the attention of Gas Engineers and Managers to their Station-meters, having made and erected the largest in use at the present time, two of which may be seen at the Stockport and Liverpool Gas Works, on application to the respective Engineers.

WHITEHOUSE and CO.,
BOILER & GASHOLDER MAKERS,
GLOBE PATENT TUBE WORKS,
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Beg to draw the attention of Engineers and Managers of Gas Works to the superior quality of the Article they manufacture, both in respect of the iron employed, and the perfect manner in which it is welded; in proof of which they can refer to the testimonials of the most eminent Gas Engineers, and the experience of the principal of the large Gas Companies of the kingdom.
Orders promptly executed.

NOW READY,

VOL. VI. of the JOURNAL of GAS LIGHTING, WATER SUPPLY, and SANITARY IMPROVEMENT, for 1857, price 21s., bound in cloth and lettered. A few copies of Vols. II., III., IV., and V. are still on sale.
W. B. KING, 11, Bolt Court, Fleet Street.

BRYAN DONKIN and CO.'s improved GAS VALVES have been adopted by numerous Gas Companies in England and abroad, and their advantages and great security fully proved. Very large numbers are in use. Prices from 11s. 6d. to 13s. 6d. per inch diameter.
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NOTICE.—INFRINGEMENT OF PATENT.

CRICKMER'S Patent Metallic Packing for Steam-Engines, Pistons, Piston-Rod Stuffing-Boxes, Pumps, &c.—Notice is hereby given that a perpetual Injunction of the High Court of Chancery has been obtained by Messrs. OASTLER and PALMER, trading under the Firm of ALEX. ROSS and CO., Grange Mills, Bermondsey, against Messrs. LITTLE and CHAMBERS, of Manchester, to restrain them from further infringing the above Patent; and that the above Packing can only be obtained of Messrs. ALEX. ROSS and CO., Grange Mills, Bermondsey, LONDON (the Proprietors of the Patent), or by their authorised Agents.
MILL BANDS, HOSE PIPES, & FIRE BUCKETS made to order from the best-selected Oak-Bark Tanned Leather.
Prices Current to be had on application.

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GASHOLDERS.—Extensive premises at Gorton, solely for the manufacture of Gasholders, and other heavy Wrought-Iron Structures.

GAS APPARATUS.—W. M. has an extensive assortment of patterns for Purifiers from 4 feet to 15 feet square, also round ones from 4 feet to 10 feet diameter; Scrubbers, Condensers, Washers, Columns, Girders, and Tripod Patterns, suitable for Gasholders, from 10 feet to 150 feet diameter, either Single-lift or Telescope. Contractor for Gas Works of any Magnitude. Designs, Specifications, and Estimates furnished.

WROUGHT and CAST IRON ROOFS for Railway Stations, Gas Works, Warehouses, and Sheds, prepared for Slates or for Corrugated Iron.

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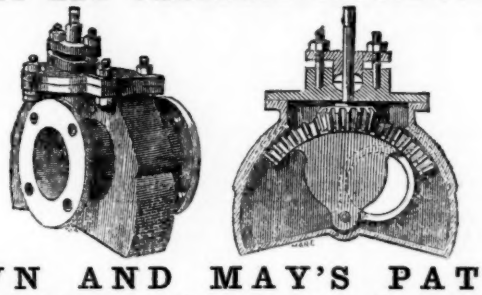
PIPES and VALVES, for Gas and Water, from 2 inches to 48 inches bore.

BEST AND CHEAPEST SLUICE-COCK.



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Above 3-inch diameter, price 10s. per inch. Brass face, 6d. per inch extra.
Can be taken to pieces without being removed from the line of Piping.
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Where a Sample may be seen.

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These Meters are as simple and durable as the Gas-Meter, and as correct as that instrument in the registration of the fluids passing through them.

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is the most effective preventive of fraud by "tilting," and is as simple in construction as the common meter.
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No. 1—1 ft. 6 in. wide, any length.
No. 2—3 ft. wide do.
No. 3—4 ft. wide do.
No. 4—5 ft. wide do.
No. 5—Set of three to one Fire, viz.—one 4 ft. wide at the top, and 15 in. each side of Furnace.
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Iron and Fire-Clay Retorts set on the most improved principle.
Cast-Iron Retorts, Condensers, Purifiers, all sizes.
Hydraulic Centre-Valves, for working two, three, or four Purifiers alternately.
Gas Governors, Cast-Iron Pipes, and every description of Gas Castings at the cheapest possible prices.

Plans and Specifications prepared for every description of Apparatus in the Manufacture and Distribution of Gas.
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SIDE, has long been known to sell the following Castings at prices lower than any other house in London:—Socket and Flange Pipes, Bends, Branches and Tees, Syphons, Lamp-posts, Rain-water Pipes, &c.; also, Hot Water Pipes, Elbows, Tees, Cylindrical and Saddle Boilers, and every Fitting for the same. Drawings and Prices of the above on application to J. JONES, Iron Bridge Wharf, 6, BANKSIDE, near the Southwark Iron Bridge.

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*** Country orders executed with care and despatch.

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DEEPDALE FIRE-CLAY AND BRICK WORKS,
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Manufacturer of every description of Fire-Bricks, Lumps, Quarries, Shields, Flue Covers, &c., to any size or shape required.

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TO MODEL OR DRAWING.

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(Established 1830),

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Manufactory for every description of Casting and Machinery for Gas Works and Water Works.
Warehouse in London for Cast-iron Pipes and Connections of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
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C. H. is prepared to carry out the warming and ventilation of public buildings, &c.; also civil engineering in general.

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Manufactory—Broad-street, Birmingham,

MANUFACTURERS OF GLASS CHANDELIERS, GLASS LUSTRES, TABLE GLASS, &c. &c.

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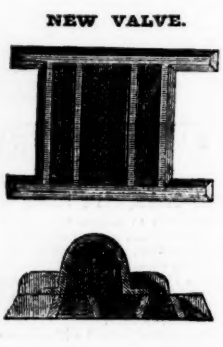
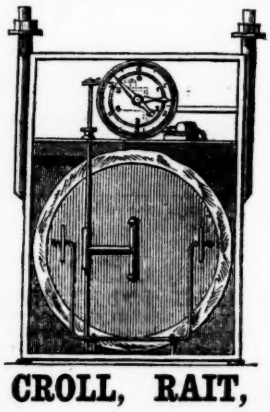
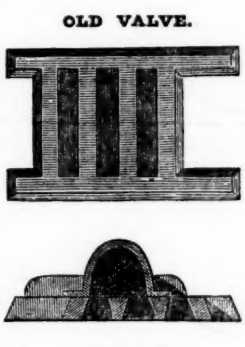




OLD VALVE.



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